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OBSERVATIONS ON SCALE-INSECTS (COCCIDAE)—IV.

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Llaveia abrahami, sp. nov.

Female, adult. Ovate, strongly gibbose above and flattened beneath; segmentation both on the dorsum and venter distinct. Colour, in alcohol, buff-yellow; with a thin deposit of white secretion in the hollows between the segments; legs and antennae yellowish brown. It is highly probable that much of the secretion had disappeared in the alcohol in which the specimens were preserved. Antennae of eleven segments, 2nd and 11th longest; 3rd a little shorter than the latter, but much longer than the succeeding ones, which are submoniliform in shape; average length 0.8–0.9 mm. Legs relatively short; tarsi a little more than half the length of the tibiae; front pair shortest, measuring 0.85 mm.; posterior pair longer, measuring 1–1.1 mm.; hairs relatively long and slender; claws simple, though in one example two of these organs have a well-marked tooth-like projection *dorsally*, just above the curved tip. Derm both dorsally and ventrally rather thickly set with very short fine hairs; margin with a narrow band of long fine hairs, the longest of which measure 0.6–0.7 mm. Pores dorso-ventrally relatively very small, circular and with beaded rims; these are less numerous than the fine hairs; those at the margins are slightly larger, much more numerous, and many have clear triangular-shaped centres. Anal segment of abdomen with three large ovate rings, the central one being slightly the largest and measuring about 0.2 mm. in its longest axis. Length, after maceration in KOH, 8–9 mm.

Larva. Very like those of the genus *Icerya*. Marginal hairs of great length, those in the abdominal region measuring 0.7–0.8 mm. There are four pairs of very long caudal hairs, the median pair slightly the longest, measuring 1.1–1.2 mm. Antennae of six segments; terminal segment with many hairs, of which six to seven are much the longest, the longest measuring 0.5 mm. Derm rather thickly set with long fine hairs and numerous pores similar to those in the adult but relatively larger. Legs

hairy; digitules long and slightly dilated, upper pairs wanting; claws slender, with a distinct ventral tooth near the tip. Eyes prominent and somewhat hemispherical. Length, 0.9–1 mm.

BRITISH GUIANA: Issororo, N.W. District; "inhabiting indentations in the bark of a rubber-producing tree (*Sapium jenmani*); attended by ants which construct coverings over the Coccids," 3.vi.15 (*A. A. Abraham*, per G. E. Bodkin).

Differs from *L. primitiva* (Townsend) in its larger size, the number of antennal segments, and the absence of spines on the legs.

***Llaveia primitiva* var. *pimentae*, nov.**

Female, old adult. Dried example (1 only) elongate-ovate, highly convex dorsally, hollow ventrally, the latter character almost as marked as in certain species of the genus *Lecanium*; segmentation of the abdominal region fairly distinct above; the cephalo-thoracic region with a faint median keel, not extending to the front margin. The whole of the body clothed with a dusky white, farinaceous secretion, which is denser in the hollows of the abdominal segments, the irregular depressions of the thoracic area, and the hollow ventral surface; the last-named also containing a small quantity of pure white flocculent matter, in which were found two dead larvae. Antennae of nine segments; formula: 9, 1 (or 1, 9), 3, 2 (or 2, 3) (4, 5) (6, 7, 8), all the segments longer than wide; length twice that of the anterior femur plus trochanter, or slightly more. Legs (anterior pair) relatively short; femora incrassate, equal in length to the upper portion of the tibiae, the latter nearly one and a half times the length of the tarsi and furnished ventrally with nine to ten long slender bristles; claws smooth on the under surface. Integument dorso-ventrally rather densely clothed with long stout bristles, and almost as thickly beset with circular "rosette" pores; marginal hairs much longer and denser than those seen elsewhere, more especially so are they on the abdominal segments. Venter, near the distal extremity, with three large oval rings. Length (after maceration in KOH), 5.5 mm.

Female, young adult. Similar to the preceding, but with the marginal hairs very long, the longest of them equalling the length of the antennae. The only example has the antennae asymmetrical: one of ten segments with a partial division of the 4th, the other of seven segments only.

Female, second stage. Shape similar to that of the old adult, but less than half the size. Dorsum with or without a median ridge; completely covered with a dense, pale yellowish-white secretion; segmentation faintly indicated. Antennae variable, and in two examples asymmetrical, of eight or nine segments. Integument much more densely hairy than in the adult; marginal hairs as in the young adult female. Length, 2.8–3.2 mm.

Larva (fully developed). Short ovate. Marginal hairs long and continuous in front; the longest of those on the cephalic margin longer than the antennae. Caudal hairs in four pairs, of which the median pair is the shortest and less robust than the others, the longest hairs three-fourths the length of the body. Antennae with seven long hairs, the longest of which is nearly equal in length to the antennae. In the embryo larvae, taken from the body of the parent, the integument appears more

densely hairy than in the fully developed larva, owing apparently to the somewhat contracted nature of the integument. This applies also to the pores in the two stages respectively.

JAMAICA: on Pimento (*Pimenta officinalis*, Lindl.), 1916; "attended by the so-called 'stinking-ant,' *Cremastogaster* sp., and to be found under the loose bark; not of great importance." (A. H. Ritchie).

This may possibly prove to be Townsend's *Llaveia primitiva*, the slight differences being possibly due to the age of the individuals. Probably the normal number of antennal segments will prove to be ten. More material is needed.

Monophlebus ? hirtus, Brain.

Brain* in his brief description of *Monophlebus hirtus* states that "the dermis is closely crowded with slightly clubbed glandular hairs and occasional long hairs, the latter fitting into thickened sockets," these characters being the salient features of the species. In the only specimen I have before me, the derm, more especially at the margin, is crowded with stout, blunt, curved spines (fig. 1, *b*), which, though

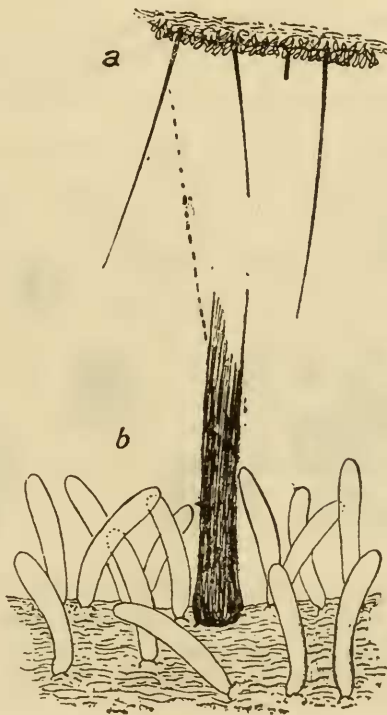


Fig 1. *Monophlebus ? hirtus*, Brain, ♀; marginal spines and hairs.

slightly narrowed proximally, can scarcely be said to be club-shaped. Before my example was passed through the various reagents and mounted in Canada balsam, the margin was seen to be broadly set with long and very stiff hairs (fig. 1, *a*); but these were so easily deciduous and brittle that the majority of them broke away in the preparation. Length, 7.2 mm.

NYASALAND: Mt. Mlanje, 1913 (*S. A. Neave*).

* Trans. R. Soc. S. Africa, v, p. 165 (1915).

Aspidoproctus neavei, sp. nov.

Female, adult. Ovate, sides elevated and more or less concave; dorsum in front relatively low; abdominal region highly convex. Cephalic or frontal depression well marked. Marginal dentate appendages long, rectangular, widely separated and ivory-like in colour and texture; there are about 25 of these altogether. Submarginal series of processes on the *anterior half of the body* (four to five in number) not quite so long as the marginal ones, but more robust and often irregularly dentate; the abdominal series, in continuation, diminishing in size distally. In the median line in front is a pair of small processes and behind them two to three *large single* ones. Midway between the median and submarginal processes are three very deep pits or depressions. Cavities and hollows coated with creamy white, granular secretion. Colour pale to dark castaneous; dull orange-crimson in alcohol; lower

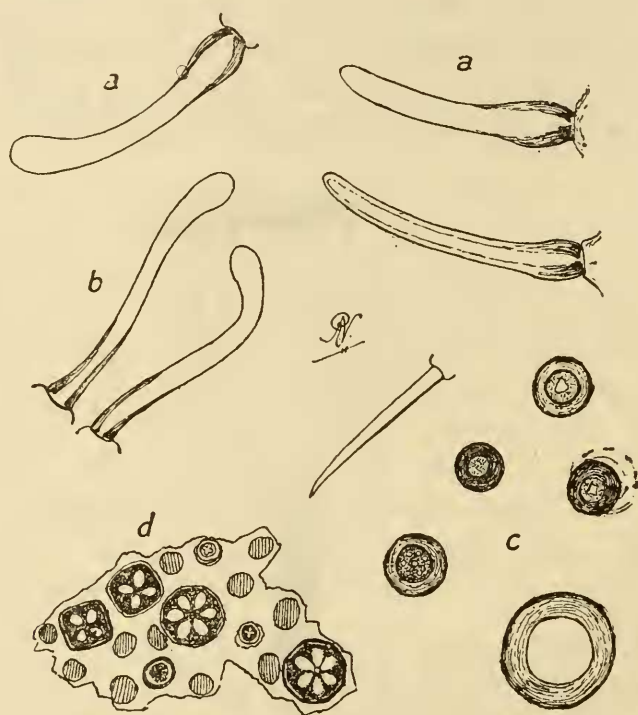


Fig. 2. *Aspidoproctus neavei*, Newst., sp. n., ♀;
a, spines of gland tracts; *b*, marginal spines of
 lip of marsupial opening; *c*, pores; *d*, pores
 at angle of marsupial opening.

surface paler. Secretory operculum relatively small compared with the size of the insect; it is normal in shape and of a dark brown colour. Antennae of ten segments; 3rd to 7th inclusive broader than long; 9th and 10th much the narrowest, being about half the width of the 6th, the 10th equal in length to the 6th, 7th and 8th, inclusive; 2nd nearly twice the length of the 4th; formula: 10, 1, 2, 3, 9 (6, 7, 8), (4, 5); two kinds of hairs present, subspinose forms and simpler slender ones; the longest of the latter equal in length to the terminal segment, and measuring 1.75 mm. Spines of the gland-tracts (fig. 2, *a*) incrassated proximally, apex bluntly pointed or sometimes slightly dilated; those of the proximal lip of the marsupial opening (fig. 2, *b*) generally curved and more or less spatuliform; elsewhere, both dorsally and ventrally, the spines are simple and more or less acutely pointed. Glandular

pores (fig. 2, *c*) circular ; some apparently with compound openings others with a triangular, quadrangular or circular openings. Length, 15.5–21 mm. ; width, 12–15 mm. ; height, 6–9 mm.

Female, second stage. Ovate, sometimes slightly narrowed anteriorly ; posterior half of margin rather broadly produced or flattened ; dorsum convex. Marginal dentate processes similar to those in the adult but smaller. Dorsum without dentate processes and, with the exception of the rubbed portions, covered with granular secretion. Dorsal glandular pores circular, with four openings. Glandular pores at the angles of the marsupial opening (fig. 2, *d*) of three types ; a relatively small form of somewhat variable shape, a large form with six openings, and a roughly quadrate form with four openings. These glandular orifices in the old adults become more or less obscure owing to the density of the chitin.

NYASALAND : Mt. Mlanje, on "Mwange" tree, x. 1913 (*S. A. Neave*).

This Coccid differs from *A. pertinax*, Newst., in being less convex (especially in the abdominal region), and in the larger size and arrangement of the dorsal thoracic processes.

***Aspidoproctus verrucosus*, sp. nov.**

Female, adult. Subhemispherical, produced in front, flat beneath ; secretory operculum complete. Integument blackish ; sparsely clothed with dusky golden pubescence, and punctate between the patches of secretion. Margin with short, tooth-like, contiguous appendages, dusky white in colour, with here and there faint traces of yellow, tips more or less pure white. Frons with two converging rows of similar, but smaller and confluent, processes. Above the last-named in the middle line are three widely separated, transverse rows of very small tooth-like appendages surrounded by dusky granular secretion. Leading from the third group towards the anal margin is a narrowly ovate series of scurfy patches and surrounding them an almost complete circle of similar patches of secretion. Between the various tooth-like processes are other irregular patches of secretion, which collectively give the insect a decidedly warty or more or less mottled appearance. Derm rather densely clothed with relatively long spines, some of which are truncated, possibly owing to injury. The special gland-tracts at the margin of the abdominal area surrounded by a dense wall of spines taking a quadrangular or rectangular form ; within these are one or two small groups of circular glands. There are at least three other types of glands on the venter, including a large quoit-shaped one of slightly varying dimensions, these being most conspicuous in the region of legs ii. and iii. Length, 8.5 ; width, 7.3 ; height, 5.5 mm.

UGANDA : Ngamba Is., on trunk of a fig tree, 16. v. 14 (*Dr. G. D. H. Carpenter*).

In its general shape this Coccid resembles a very small example of *Aspidoproctus pertinax*, Newst. ; but it is otherwise markedly distinct. The mouth-parts and antennae were absent in all the specimens, and were evidently detached when removing the insects from the tree.

***Palaeococcus bicolor*, sp. nov.**

Female, adult. Ovate, narrowed in front, covered with short bright yellow or white waxen processes, which are arranged in seven more or less well-defined rows :

one short, median, and three on each side, the lateral rows continuous behind; intervening spaces with somewhat granular wax; margins with outstanding hairs, which appear more numerous and much longer posteriorly. Venter, in the oldest examples, with a relatively thin layer of white wax, but this, in the specimens submitted, does not form a distinct ovisac or pad. Antennae of nine to ten segments; in two instances they were asymmetrical; terminal segment not quite so long as the two preceding ones together; there is a long slender spine on the second, and long stout hairs on the succeeding ones, in addition to which there are two to three very long slender hairs on the terminal segment, one of which is equal in length to the last two segments together. Legs very robust and long. Derm markedly hirsute; spinnerets large, circular and almost as numerous as the hairs. Stigmata relatively small. Margins with immensely long stout hairs, the longest being three times the length of the antennae. Many of the marginal hairs are dilated and frayed distally and sometimes present three distinct, lateral ridges, resembling somewhat the proximal half of the scapula of a mammal in miniature; these are clearly malformations due, possibly, to injury by abrasion. Length, 5.5 mm.—6.5 mm.

Female, second stage. Waxed covering similar to that of the adult, but the median and submedian rows are not so pronounced; colour bright yellow, or rarely pure white. Antennae of seven segments, of which the third and seventh are the longest. Derm sparsely hirsute; pores much fewer than in the adult. Marginal hairs of immense length, the longest and stoutest arising from the abdominal segments; these are, when perfect, four times the length of the antennae, or slightly longer than the entire length of the insect. Length, 2–2.3 mm.

Larva. Antennae with the terminal segment markedly incrassate, with five immensely long, stout, lateral hairs; the largest about twice the length of the antenna. Derm thickly set with fine long hairs; margins with similar but slightly longer hairs; terminal segment of abdomen with three pairs of long hairs, of which the median pair is about half the length of the others; the two pairs of longest hairs three times the length of the antenna, or about one-fourth longer than the body.

GOLD COAST: Aburi, on *Thespesia* sp. (*W. H. Patterson*).

The general appearance and arrangement of the cereous coverings of the old adults resemble somewhat those of the young adult ♀ of *Icerya seychellarum*, Westw.; but the strongly hirsute character and great length of the marginal hairs may readily serve to distinguish it. That the colour of the waxy covering should vary between bright yellow and white is rather remarkable, but the former, so far as one can judge from the few examples at hand, is the predominant colour. There is no admixture of the two colours in the same individual; all are either entirely white or entirely bright yellow.

Palaeococcus caudatus, sp. nov.

Female, adult. Apparently without any trace of an ovisac; dorsum covered with short stout waxen processes, white or dirty white in colour and thickly felted in texture; these processes are arranged in seven rows: the median row much the broadest and coalescing, more or less; the other rows almost uniform in size

and continuous in front, so that they appear concentric with the median row; the marginal row almost hidden by the submarginal row. A number of long hairs project beyond the waxen covering, especially at the margin in front. Posterior extremity markedly narrowed and with a single long stout waxen appendage or tail-like process. Integument, antennae and legs of dead examples pitchy-black. Antennae of eleven segments and of the usual form found in the females of this genus. Legs normal. Marginal hairs very long, the longest being a little more than one-third the total length of the body; these hairs are much more numerous in front and also posteriorly; at the sides of the body they are arranged in rather widely separated groups. Integument densely studded with relatively large circular spinnerets, interspersed with fine short hairs, the latter much more numerous ventrally. Length, inclusive of waxen appendages, 7–8 mm.; length, exclusive of caudal appendage, 5 mm.

Female, second stage. Dorsum with five rows of white waxen appendages; median row coalescing; submedian and marginal rows much shorter than in the adult female; caudal process similar to that in the adult. Antennae of nine segments; marginal hairs and spinnerets as in the adult, but the former are relatively longer, being about one-half the total length of the body.

UGANDA: Entebbe, on crotons, 13.viii.12 (*C. C. Gowdey*).

The somewhat pyriform outline of the female, with the long stout caudal appendage, should readily serve to distinguish this insect from any of its allies.

Palaeococcus cajani, sp. nov.

Female, adult. Ovate and highly convex. Waxy covering pure white, the arrangement very like that of *Icerya euphorbiae*, Brain,* but more or less distinct processes are traceable; these are arranged as follows: margin with 13–14 short and bluntly rounded processes packed closely together and coalescing behind; immediately above them is a well defined constriction, and over this a ridge with similar but more irregular processes; cephalic extremity with an irregular cluster of blunt processes; the rest of the dorsum denuded by pressure in packing. Colour of integument black. A number of fine hairs protrude through the waxen covering. No ovisac, but a little flocculent secretion beneath the body. Length of dried example, 3.9 mm.

When first placed in chloroform the marginal appendages show up very distinctly and the outstanding hairs are regularly arranged so that a pair of them (one dorsal, the other ventral) form the dividing line between the waxen processes. Colour in this medium, dull orange-crimson. Antennae (fig. 3, *a*) of nine segments; the terminal equal in length to the second and third together; all, with the exception of the last two, broader than long; hairs of two kinds: a relatively short form, which is somewhat spinose, and a very long slender one; the longest on the last three segments, one of which is twice the length of the distal segment. The antenna on the opposite side has the articulations of the third and fourth segments very faintly indicated. Legs with the femora very broad; tibiae and tarsi with slender hairs of varying lengths. Derm scantily clothed with hairs; pores (fig. 3, *b*)

* Trans. R. Soc. S. Africa, V, p. 167, pl. xxii, fig. 48.

circular, presenting the characteristics shown in the illustrations according to the plane in which they are focussed. Marginal hairs very long; one of the longest, just behind the antennae, about one-fourth longer than the latter, or about half

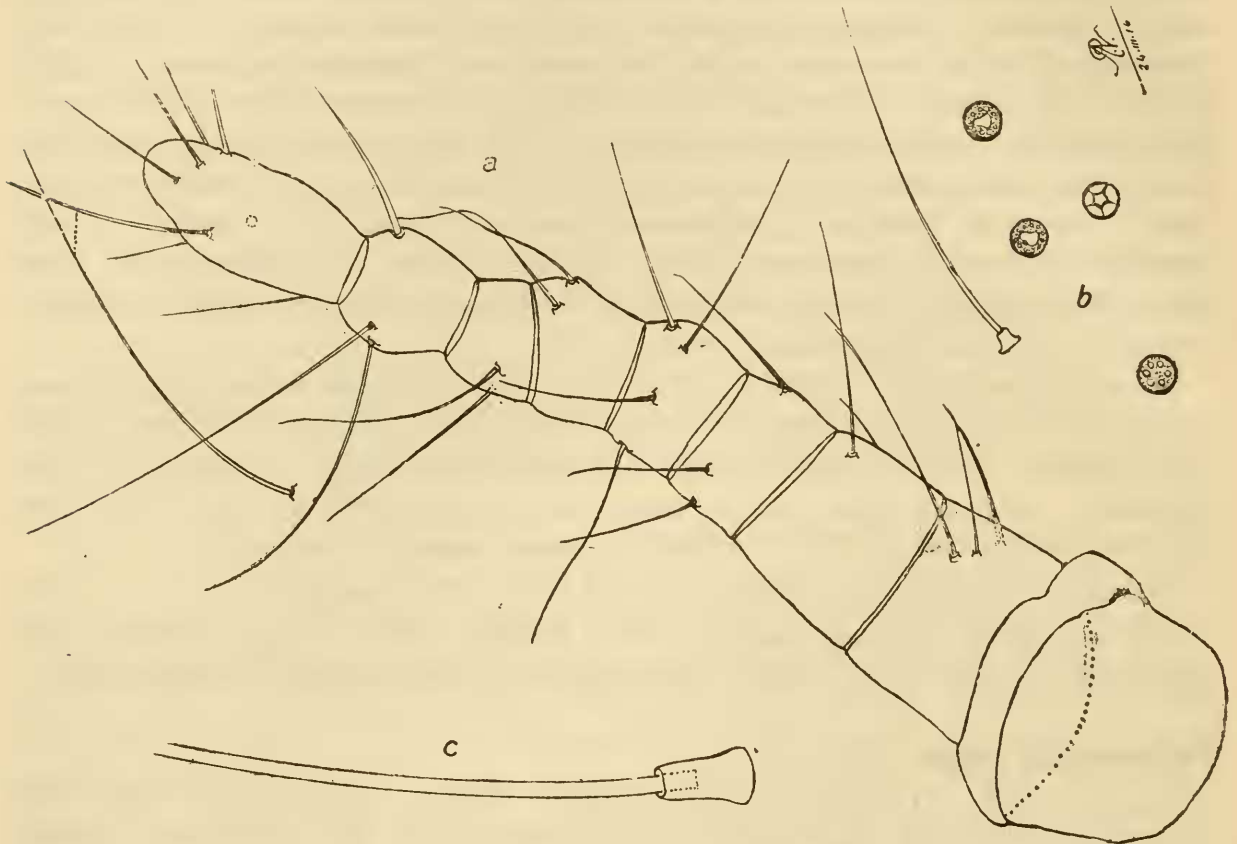


Fig. 3. *Palaeococcus cajani*, Newst., sp. n., ♀; a, antenna; b, gland pores; c, base of dermal hair.

the width of the body; these structures are readily deciduous and very few are left intact in mounted material.

S. NIGERIA: Agege, on pigeon pea, 1914 (*Dr. W. A. Lamborn*).

***Icerya nigroareolata*, sp. nov.**

Female, adult. Secretionary covering and appendages very like those of *Icerya aegyptiaca*, Douglas, but the flocculent matter beneath the appendages is thicker. When macerated in KOH the females assume a very elongate form, thus differing materially from *I. aegyptiaca*, which is *broadly ovate*. Antennae of eleven segments; fourth the shortest and broader than long; eleventh longest and twice the length of the tenth; hairs very long and for the most part arranged in whorls, the longest hairs (terminals) being slightly longer than the two last segments together; formula 11 (2, 3) (7, 8, 9, 10), 1, 4, or 11 (2, 3, 7, 8, 9, 10), 1, 4. Legs robust; hairs on the upper surface of the tibiae very long, the longest being equal in length to the tarsi (fig. 4, a); digitules simple. Marginal hairs relatively short, the longest arising from between the antennae and also at the anal extremity; some of the former about half the length of the antennae. Derm rather sparsely hirsute. Pores or spinnerets (fig. 4, b) of two types: one large, with an inner hexagonal

border; the other less than half the diameter of the former, with a beaded margin; the large ones are generally distributed over the dorsum and also form large triangular groups along the margin of the abdomen. Venter with three large vaginal discs or areoles, the laterals (fig. 4, c) reniform, the median one ovate, with a faint central transverse division or construction; these, if maceration is not carried too far, are seen to be completely covered with opaque black pigment; when the pigment is partly removed a finely reticulated surface is visible, but when completely removed the reticulation may disappear almost completely. Length of macerated specimens, 5–6 mm.; width, 2.50–3 mm.

Larva. Very elongate. Gland pores or spinnerets as in the adult; arranged in regular transverse rows, the larger ones preponderating, the smaller ones confined chiefly to the median line. Terminal segment of the antennae with three long hairs, the longest being one-fourth longer than the antennae; the remaining hairs are also very long, but less than half the length of the longest. Marginal

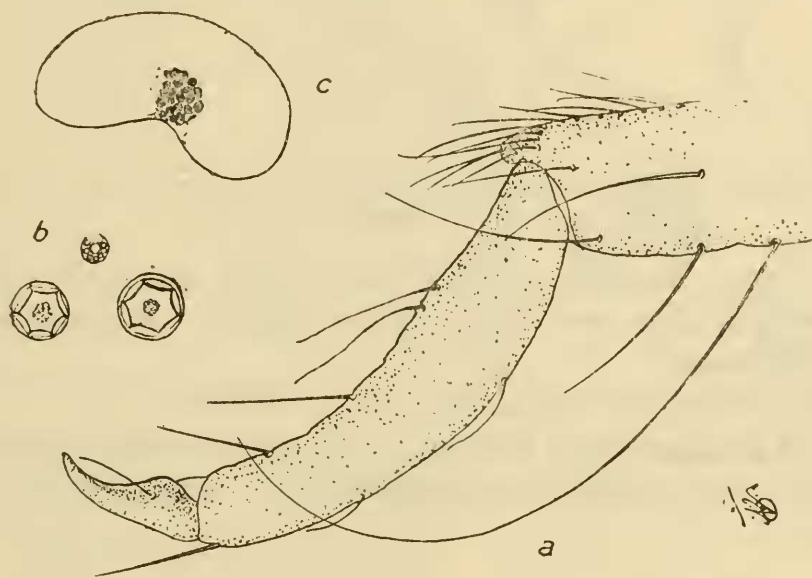


Fig. 4. • *Icerya nigroareolata*, Newst., sp. n., ♀; a. tarsus; b, gland pores; c, lateral areole, with portion of pigmented surface.

hairs very long, the longest of the abdominal ones nearly as long as the antennae; the long caudal hairs six in number, three on either side of the anal orifice; two are very long, being almost as long as the body, the third a little more than half the length of the others. Length, 0.9–1 mm. Length of antennae, 0.4 mm.

UGANDA: Kampala, on coffee, 4.xi.13 (C. C. Gowdey); Jinja, on croton, 1914 (Dr. R. Van Someren).

***Icerya sulfurea* var. *pattersoni*, nov.**

Female, adult. Waxy covering bright pale yellow; covering of the dorsum imperfect, but that which remains is suggestive of short stout plates; marginal series of waxy appendages long, broad, curved downwards and slightly curled distally. Ovisac well defined; colour, white or white with a faint tinge of yellow. Derm faintly hirsute, but thickly studded with minute hairs interspersed with long slender ones. Margins with irregular groups of long outstanding hairs, the

longest varying between one-third and one-half the length of the antenna. Pores circular and very numerous; these are of two sizes: the larger (fig. 5, *a*) being twice the diameter of the others. Antennae (fig. 5, *b*) of eleven segments; terminal segment much the longest but scarcely wider than the preceding one.

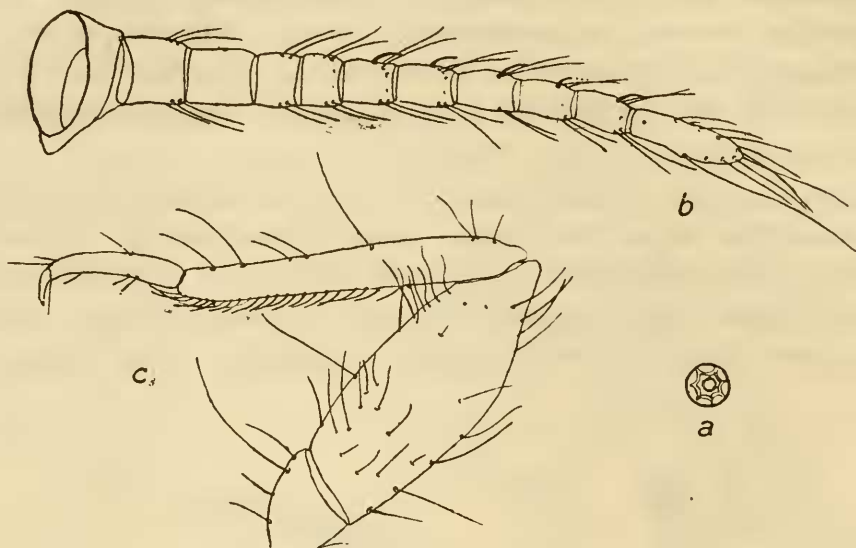


Fig. 5. *Icerya sulfurea* var. *pattersoni*, Newst., nov., ♀;
a, pore; *b*, antenna; *c*, leg

Legs (fig. 5, *c*) long; femur very short; claw faintly bidentate, digitules simple hairs; underside of tibia very hairy. Eyes truncate. Stigmata large, slightly longer than the tarsus.

GOLD COAST: Aburi, on *Tectona* sp. (*W. H. Patterson*).

The form and arrangement of the waxen appendages are very like those in *Icerya aegyptiaca*, Doug., but the bright pale yellow colour is distinctive and the structural details differ.

Margarodes buxtoni, sp. nov.

Female, adult. Form rather elongated and very tumid. Derm almost completely covered with a layer of white, mealy secretion. Colour in alcohol, dull brownish-crimson. After maceration in KOH the body assumes a broadly ovate form (fig. 6, *a*). Derm, on both surfaces, finely but markedly pubescent, the individual hairs relatively long and exceedingly slender. Pores (fig. 6, *f*) circular, with a central opening and numerous minute ones surrounding it; these organs are almost as numerous as the hairs, more especially so on the terminal segments of the abdomen. Antennae (fig. 6, *b*) short, stout, and widest proximally, composed of eight segments, each (with the exception of the last) with a well-defined chitinous band; distal segment with several minute stout spines, and two groups of long fine slender hairs; the remaining segments are apparently nude, but of this one cannot be quite certain, as the innumerable hairs on the surrounding integument are lying superimposed over a great portion of the antennal segments. Anterior leg (fig. 6, *c*) large, stout, and more than twice the size of the other limbs; claw densely chitinised and distinctly articulated with the exceedingly short tarsal segment; tibio-tarsal articulation well defined, and immediately below this is a

distinct group or tuft of long fine hairs. Posterior legs (fig. 6, *d*) not differing materially from the intermediate pair; claws distinctly articulated; digitules represented by slender hairs. Eyes well developed, truncate, and placed considerably below the antennae (see fig. 6, *a*). Thoracic stigmata (fig. 6, *e*) large and somewhat reniform in outline; outer lateral lobe-like extension with a group of circular pores; abdominal stigmata present on the first and second segments only; these organs are represented by minute circular orifices, external to which is a roughly horse-shoe-shaped thickening of the body wall. Anal orifice circular;

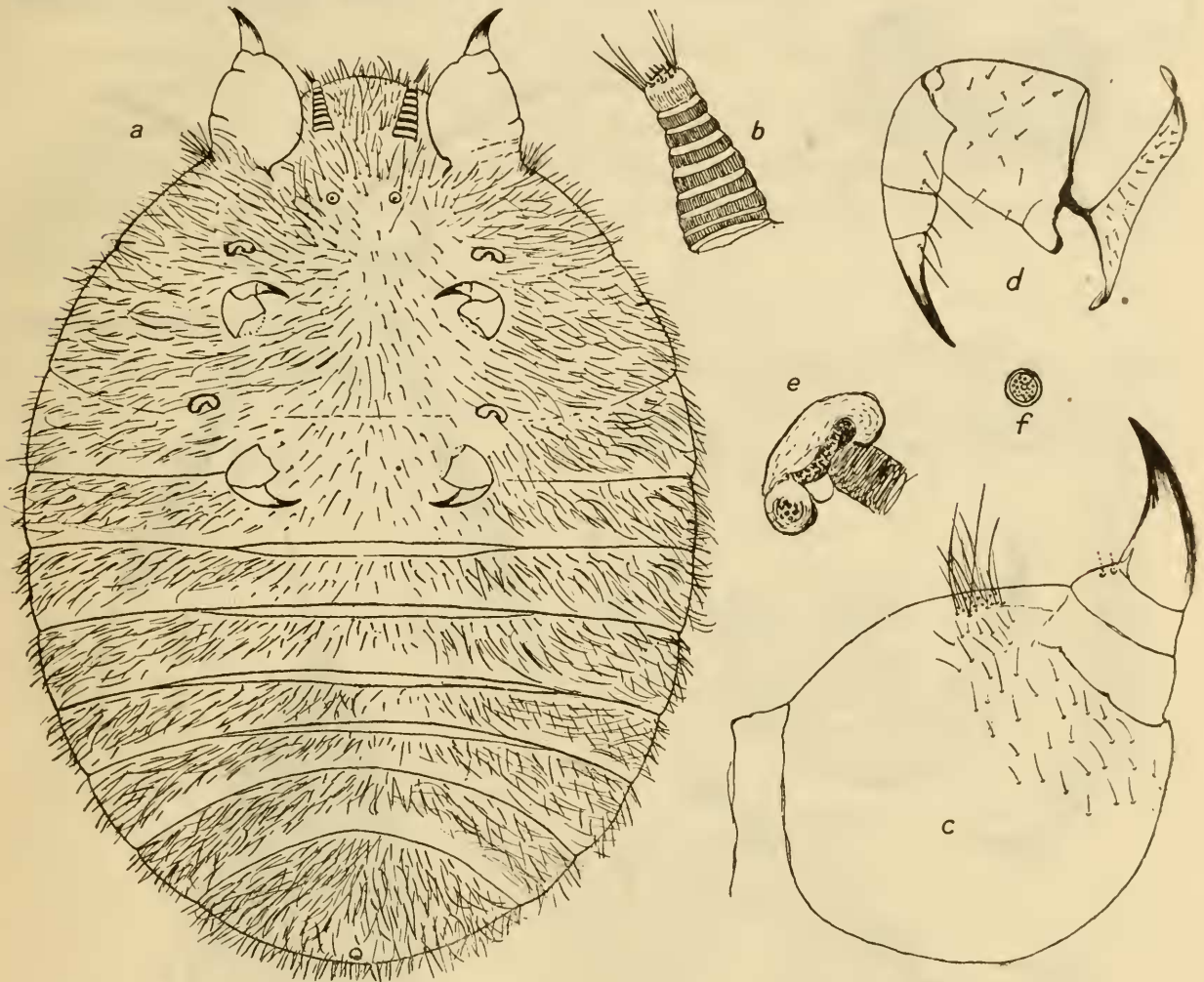


Fig. 6. *Margarodes buxtoni*, Newst., sp. n., ♀; *a*, ventral view of a specimen cleared in potash; *b*, antenna; *c*, front leg; *d*, posterior leg; *e*, stigma; *f*, pore.

ring strongly chitinised, with a disc-like structure at the distal margin. Vaginal orifice nearly opposite the anal opening. Length, 5.7 mm.; width, 4.3 mm.; length of front legs, 1 mm.

Male (fig. 7, *a*). Colour of dried specimens dark piceous; when placed in potash, rich dark crimson. Wings hyaline; costa pale crimson, darkening distally; veins, of which there are traces of three, faintly indicated; outline variable in the two examples before me; in one the wing is slightly longer and narrower than the other. Subterminal segment of the abdomen with a dense tuft or pencil of fine white silky filaments. Antennae (fig. 7, *b*) of nine segments, and finely pubescent; distal segment

much the longest, and furnished near the tip with a minute circular sensorium ; articulations of the last four segments with relatively broad and clear integument. Eyes large, compound ; a single prominent ocellus on the proximal edge of each of the compound eyes. Sculpturing of thorax doubtful, but apparently with prominent rounded gibbosities. Anterior legs (fig. 7, *d*) much shorter and more markedly robust

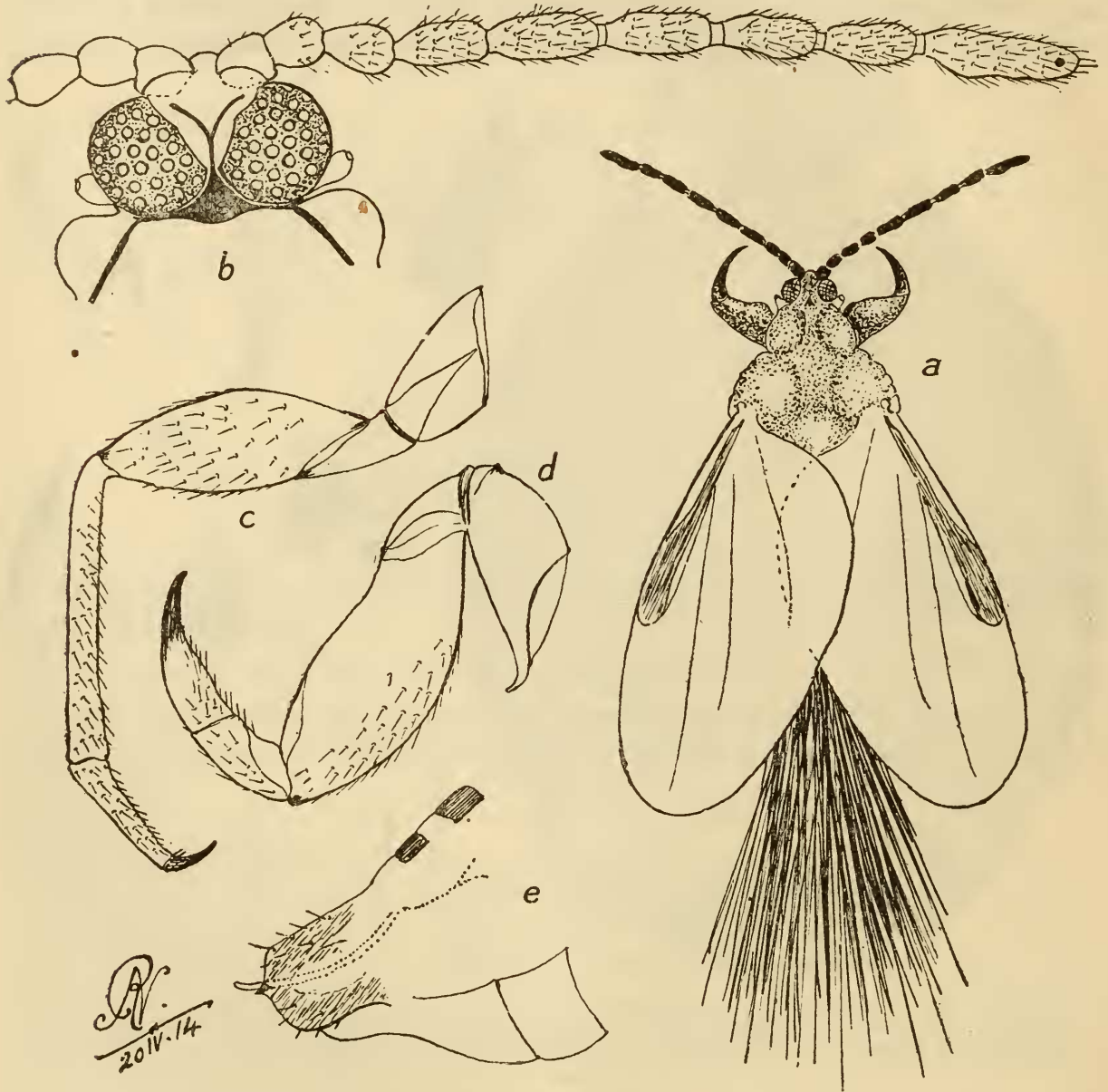


Fig. 7. *Margarodes baxtoni*, Newst., sp. n., ♂ ; *a*, dorsal view, from a dried specimen ; *b*, head and antenna ; *c*, hind leg ; *d*, front leg ; *e*, pygidium, lateral view.

than the others ; tarsus and claw united, the latter strong, stout and densely chitinised ; femur, tibia and tarsus with fine hairs. Posterior leg (fig. 7, *c*) well developed ; the tibia a little more than twice the length of the tarsus ; claw distinctly articulated ; femur, tibia and tarsus clothed with fine hairs. Terminal segment (fig. 7, *e*) broad and somewhat quadrate, with a distinct median angular projection ; intromittent organ slender and cylindrical. Owing to the density of the chitin the special groups of

glands from which the tuft of silky filaments arise are not traceable. Length, inclusive of the anal tuft of filaments, 4.5 mm.; exclusive of the filaments, 2.5 mm.

ALGERIA: El Kantora, 13.iv.13, 1 ♀, 2 ♂♂ (*P. A. Buxton*).

Mr. E. E. Green, to whom I forwarded the above description and drawings, considers that "this *Margarodes* is undoubtedly a new species. In its hairy integument it approaches my *M. niger*, but that species has limbs of a very different form."

***Stictococcus gowdeyi*, Newst.**

SOUTHERN NIGERIA: Agege; on young shoots of cacao, invariably protected by the ant *Oecophylla*, 1915 (*Dr. W. A. Lamborn*).

These examples differ from the type lot of specimens by being of a rich dark translucent crimson or of a translucent olivaceous yellow, sometimes with a trace of crimson. They are, in all probability, young adults which had not acquired the permanent colour of more mature examples.

***Stictococcus intermedius* sp. nov.**

Female, adult. General facies as in *L. sjöstedti*, Ckll. Pseudo-margin with a regular series of short, deep, sharply defined and slightly radial grooves, giving the extreme edge a finely crenulated appearance, as if marked by a roulette; midway between

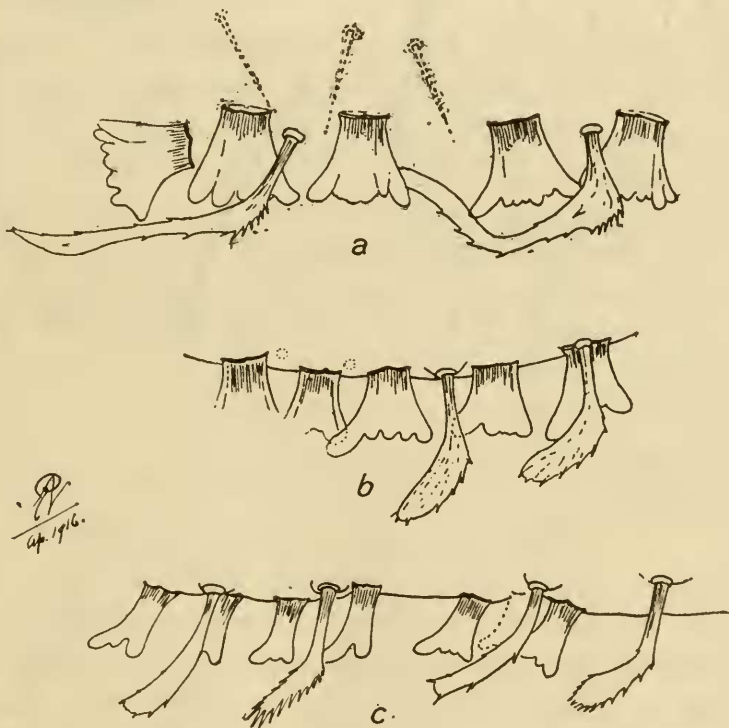


Fig. 8. *Stictococcus intermedius*, Newst., sp. n.; marginal spines of: *a*, adult ♀; *b*, second stage ♀; *c*, larva at period of ecdysis.

the median line and the roulette border is an irregular row of deep, clearly defined pits—seven to eight on either side. Colour pale to dark castaneous or piceous, with the integument polished. Marginal spines (fig. 8, *a*) of two distinct forms: (1) broad and irregularly digitate, and (2) very long, somewhat contorted, broad and

flat, geniculated, and finely spinose; just within the margin is a series of long, slender, simple spines. The young adults are reddish buff in colour, with the pits and hollows of the roulette border piceous or dark castaneous. Length, 3-4 mm.

Female, second stage. Short ovate, flat, with the sides slightly raised. Colour pale reddish-buff. Marginal spines (fig. 8, *b*) broadly digitate and similar to those in the adult, but usually with one of the lateral projections more pronounced than the rest; and a broad, flat, falciform and spinose one alternating more or less with the others.

Larva (at period of ecdysis) with the marginal spines as shown in fig. 8, *c*.

GOLD COAST: Aburi, on cacao, ? 1913 (*W. H. Patterson*).

Separable from *S. sjöstedti*, Ckll., by the form of the marginal spines (in all stages) and by the sculpturing of the dorsum in the adult female.

***Stictococcus multispinosus*, Newst.**

Male puparium. Like that of *Kermes quercus* (Linn.); a white, felted, elongated sac, and very brittle. Two examples were found wedged in between the old adult females. Neither was quite perfect; one contained a propupa, the other was empty.

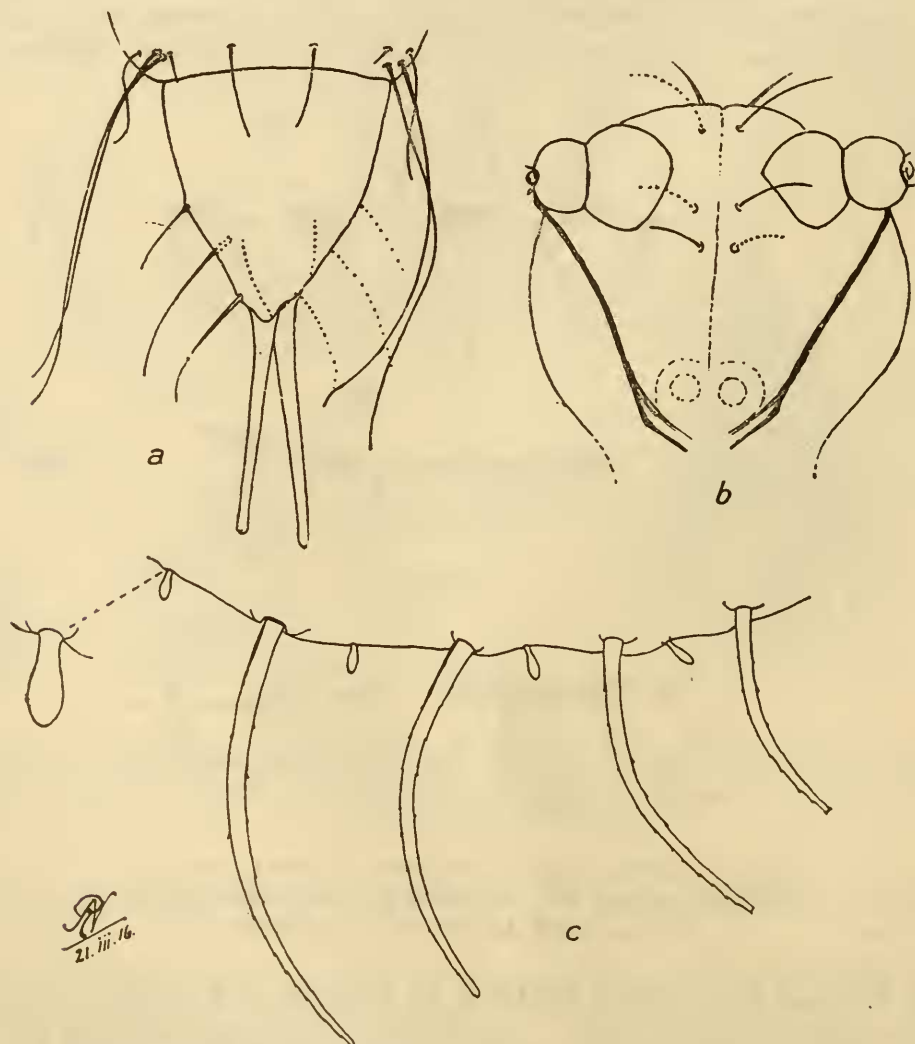


Fig. 9. *Stictococcus multispinosus*, Newst., sp. n.:
a, terminal segment of ♂; *b*, head of ♂; *c*, marginal
 spines of larva.

Propupa. Turned to dull crimson in cold KOH. Very robust. Frons with one pair of bristles. Genital sheath short, obtuse. Abdominal segments with a few stiff hairs. Length, 0·8 mm.

S. NIGERIA: Agege, on pigeon-pea stems, 1914 (*Dr. W. A. Lamborn*).

Male (imperfect). Head slightly longer than broad; ventral surface (fig. 9, *b*) with two divergent narrow sclerites, and four pairs of bristles, which are separated by a median longitudinal suture, the distal pair on the frontal margin. One pair of ocelli near the apex formed by the sclerites. Thoracic apodeme normal. Legs long, sparsely clothed with bristles; claws rather strongly falcate; lower digitules with slightly longer knobs than those of the tarsi. Abdomen very elongate; the segments with submedian and lateral bristles, the terminal segment with a pair of very long marginal bristles. Genital armature (fig. 9, *a*) with three pairs of long bristles; stylus in two parts, with the tip of one bluntly rounded, the other truncate. Length, 1·3 mm.

Larva. Marginal spines (fig. 9, *c*) of two forms; minute club shaped ones, alternating with immensely long, stout, curved and barbed ones.

UGANDA: Kampala, on *Markhamia platycalyx*, 2.ix.15 (*C. C. Gowdey*).

***Asterolecanium spectabile* sp. nov.**

Female puparium. Lanceolate and convex dorso-ventrally; margins broadly flattened, with slight constrictions opposite the stigmata; slightly narrowed and produced posteriorly. Surface strongly punctate; a definite narrow median suture extending nearly the whole length of the puparium, the suture faintly interrupted at regular intervals along the abdominal region, suggesting segmentation. Colour brilliant orange-crimson, with black suffused markings anteriorly, the latter due to the under-lying shrivelled body of the female; the narrowed posterior end opaque, glassy and colourless; the cephalic margin narrowly orange-crimson. Fringe composed of closely adjacent, straight, glossy filaments of a pinkish colour; in very young individuals this lies flat upon the surface of the leaf, but as the ventral portion of the test gets more and more convex (exteriorly), the fringe drops and becomes vertical; as a rule, it is either entirely wanting or can be traced only in isolated and abraded patches. Length, 1·3–2 mm.

Female, adult. Form somewhat doubtful, but clearly very elongate and probably filling the test at gestation. Rostrum approximately central. Paired or 8-shaped pores disposed in a single row, not extending to the posterior extremity or the extreme cephalic margin. A short series of small circular glands on the ventral margin opposite the thoracic stigmata only. Tubular glands geniculated, with the proximal end attenuated; these are distributed over the whole of the dorsal area; their length equal to the greatest diameter of the rudimentary antennae, approximately. Abdominal extremity with two minute setiferous lobes; setae short and with their tips broken away in all the preparations (eleven). Anal ring hairless, its diameter not much greater than the basal attachments of the setae of the lobes. Genital orifice relatively very large, transverse, and placed well away from the anal orifice. Rudimentary antennae with three to four extremely minute spines.

Male puparium. Similar to that of the female, but slightly narrower; the ends equally rounded. Colour as in female. Length, 1.5; width, 0.5.

The puparia of the young females (2nd stage) are amber-yellow in colour.

MAURITIUS; Botanic Gardens, on palm trees, 1915 (*E. d'Emmerez*).

A really handsome species and the only one known to me which has such brilliantly coloured puparia.

***Lecaniodiaspis tarsalis*, sp. nov.**

Female test. Colour warm buff; narrowed slightly posteriorly; dorsum convex, with a median interrupted longitudinal ridge, and about twelve transverse ones on each side. Orifice terminal, circular; projecting from it, in some individuals, is a short white waxen filament. Texture dense; surface with exceedingly minute whitish particles. Length, 2-2.2 mm.; width, 1.2-1.3 mm.

Female, adult. Legs (fig. 10, *a, a*) well developed; anterior tarsi unusually long, with a deep and clearly defined dorsal constriction; tibiae relatively short, from

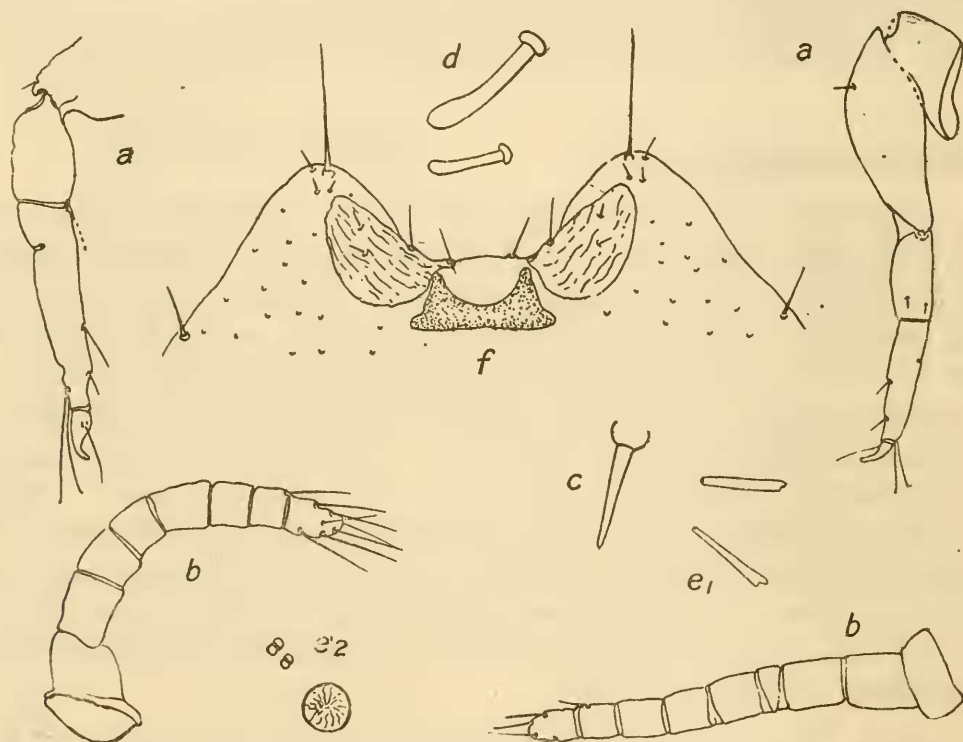


Fig. 10. *Lecaniodiaspis tarsalis*, Newst., sp. n., ♀; *a, a*, legs; *b*, antennae; *c*, marginal spine; *d*, anterior stigmatic spine; *e*₁, tubular glands; *e*₂, cribriform and 8-shaped pores; *f*, anal segment.

one-half to one-third the length of the tarsi; digitules long, those of the tarsi very faintly knobbed. Antennae (fig. 10, *b*) normally curved, of nine segments; 8th with a short hair, 9th with several; relative length of individual segments varying slightly, 2nd and 3rd usually the longest, but sometimes the 6th is as long as the 3rd. Marginal spines (fig. 10, *c*) stout and rather bluntly pointed; these are widely separated. Anterior stigmatic spines (fig. 10, *d*) two, both spathuliform, one-half the length of the other; posterior pair both short and very widely separated. Tubular glands (fig. 10, *e*₁) generally distributed over the whole of the derm, and so numerous as

sometimes to touch or slightly overlap each other; about two-thirds the length of the marginal spines; 8-shaped pores generally distributed but most numerous towards the margin. Two divergent rows of cribriform plates (fig. 10, e_2), four on each side of the median line; these are circular, with labyrinthiform gratings, the diameter about three times as great as the length of the 8-shaped glands. Anal segment (fig. 10, f) with rather prominent lobe-like extensions and a broad bilobed plate below the anal aperture, each with a pair of very short subapical spines and two long marginal hairs. Pre-anal plate with a very deep emargination. Anal ring with ten hairs.

Larva. Elongate. Antennae stout, of six segments; 3rd and 6th longest, but both relatively short. Marginal spines minute. Anterior stigmatic spines similar to those of the adult; posterior pair absent. Legs robust; anterior tarsi much longer than the tibiae. The 8-shaped pores in well-defined longitudinal rows. Anal lobes similar to those of the adult, but the terminal bristles are much longer. Anal ring with six hairs.

SOUTH AFRICA: Pretoria, 1914 (*E. d'Emmerez*).

This insect is related to *Lecaniodiaspis africana*, Newst.,* but is still more remarkable in having the legs normally developed. It differs moreover in its smaller size, the presence of marginal and stigmatic spines, the extraordinarily long tarsi, the antennal formulae, the character of the "cribriform plates," and in other details.

Phenacoccus ballardi sp. nov.

Female, adult. Dorsum, in dried example, covered with a felted mass of white secretion, completely obscuring the segmentation; margin with a conspicuous fringe of extremely long, white appendages, which are shortest in front; those arising from the cephalic margin about three times the length of the felted dorsal area. Length, inclusive of the fringe, 10 mm.

Form, after maceration in potash, slightly elongate-ovate. Antennae of nine segments, the articulation of the 3rd and 4th less pronounced than the rest. Eyes small, but prominent. Legs slender, longer than the antennae; tarsal digitules simple bristles; those of the claw very long and dilated; two strong apical spines on all the tarsi. Margin with a complete series of *inconspicuous* spinose tubercles the spines short and *truncate*; between them and surrounding them a number of large circular pores; two or three long hairs accompany each of the abdominal groups of spines. Anal lobes similar to the marginal ones. Anal ring with six hairs. Integument with a few minute scattered spines and small circular pores, the latter most numerous on the terminal abdominal segments. Length of macerated specimens, 1.7–2 mm.

Female, second stage. The marginal appendages similar in their arrangement to those in *Pseudococcus (Dactylopius) longispinus* (Targ.); but they are much longer and arranged radially; posterior pair longest. Form, after maceration, elongate. Antennae of six or seven segments. Marginal series of spinose tubercles not so clearly defined as in the adult. Integument with numerous minute spines; and there are two or three very long hairs arising from near the anal spinose lobes.

* Bull. Ent. Res., ii, p. 100, fig. 13 (1911).

Very like *P. iceryoides*, Green (Mem. Dep. Agr. India, ii, p. 26) in having a conspicuous fringe of white filaments; but in Green's species the ♀ has a "fringe of short, stout, conical spines which extend into broad clusters on the abdominal segments"; whereas in *P. gracilis* the spines are truncate and their arrangement similar to those in *P. insolitus*, Green (l.c.), but in the latter spinose tubercles are present also on the dorsum.

S. INDIA: Coimbatore, on mango, 10.ii.14; S. Kanara District, on an unnamed plant, ix.1913 (*T. V. Ramakrishna*, per E. Ballard).

Tachardia bodkini, sp. nov.

Female test. Obconical; centre with a bluntly pointed prominence, rarely with two; margin with low, blunt, and usually bifid processes, clearly the remnants of the rays of the test of the young female; surface smooth; a nipple-like prominence over the anal opening. Colour bright subtranslucent orange-red, or in certain lights faintly orange-ruby. Texture very hard and brittle, similar to that of the lac of commerce (*T. lacca*). Average length, 5.4 mm.; height, 3.3 mm.

Female, adult. Form doubtful; specimens macerated in KOH become broadly ovate when mounted under pressure. Antennae about equal in length to the greatest width of the anterior spiracles, composed of four ill-defined segments, with no trace of hairs. Post-anal spike about two and a half times the length of the antennae. Compound circumgenital glands or "tubercles" in four groups, each group consisting of over one hundred individual pores. Margin of *flattened* specimen with three pairs of large bilateral gland-tracts, the pores in each group of three distinct kinds: (a) four or five relatively large ones, with strongly chitinised subcutaneous tubes, arranged more or less in line and in the centre; (b) minute, circular and rimless pores occupying a large and roughly ovate area; (c) a complete outer ring of circular chitinous pores, resembling the circumgenital glands in the DIASPINAE, arranged on one side of the circle in a single row, on the opposite side in an irregular band, two or three deep. The large pair of spiracles shaped somewhat like a cardinal's hat, the irregular chitinous plate surrounding them beset with circular pores. "Lac tubes" circular, the chitinised rim convex, the greatest diameter about equal to the length of the antennae; interior with relatively large pores. Anal chitinous tube shagreened, *i.e.*, set with minute, closely adpressed spines; apical plates cuneiform or notched; anal ring with (?) ten hairs.

Female test, second stage. Five-rayed, the anterior and posterior rays longest; central area with a nipple-like prominence. Colour slightly darker than that of the adult. Length, 1.8–2 mm.

Male puparium. Subcylindrical, each extremity with a pair of short lateral rays; dorsum with a central nipple-like extension, on either side of which is a distinctly segmented, convex, median ridge. Length, 1.8 mm.

BRITISH GUIANA: near Repos, Georgetown, on *Sapium jenmani*, xii.1915 (*G. E. Bodkin*).

Froggatt* has described a species (*T. angulata*) the test of which, he says, comes to a blunt point at the apex, its general appearance resembling a large blunt

*Proc. Linn. Soc., N.S.W., xxxvi, 1911

rose-thorn. This applies, in a general way, to Bodkin's specimens; but the apical extension of the test in *angulata* is fluted, whereas in *bodkini* it is perfectly smooth. The structural characters of the two species are, however, quite distinct. I have pleasure in dedicating this species to its discoverer.

***Pulvinaria aristolochiae*, sp. nov.**

Female, adult. More or less cordate in outline and rather flattened; dorsum almost completely covered with a well-defined layer of flake-like wax which varies in colour from dirty grey to greyish brown. Antennae (fig. 12, *a*) of eight segments; 3rd, 4th and 5th unusually long, the two first-named markedly swollen distally; 3rd about twice the length of the 4th; three long hairs on 2nd, one of which lies (in three examples) close up to the succeeding segment; there is also a long distal hair on the 3rd; two on the 5th; a single slender spine on the 6th, 7th and 8th, the last-named also with a few very short hairs. Legs (fig. 12, *b*) stout, long; tarsus relatively very short, less than one-third the length of the tibia; lower digitules long

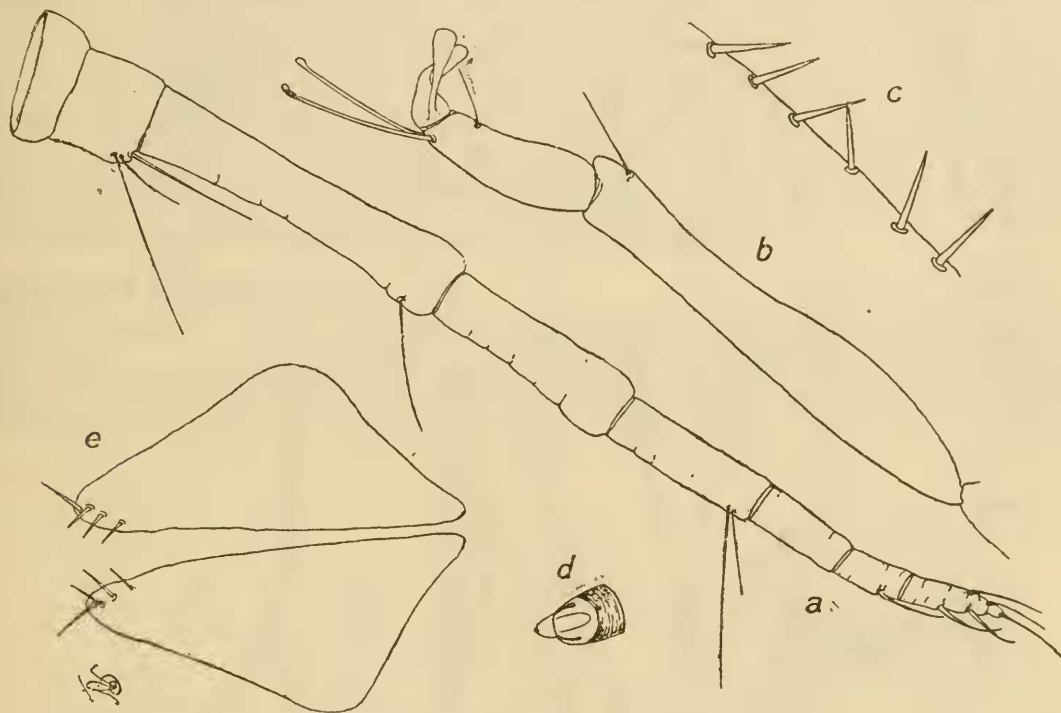


Fig. 12. *Pulvinaria aristolochiae*, Newst., sp. n., ♀; *a*, antenna; *b*, leg; *c*, marginal spines; *d*, submarginal tubercle; *e*, anal lobes.

and very broadly spathuliform. Marginal spines (fig. 12, *c*) stout, pointed and placed rather closely together; stigmatic spines broken away in all the specimens, their points of attachment being *continuous with* the marginal series. Submarginal pores (fig. 12, *d*) very large, continuous, but rather widely separated. Anal lobes (fig. 12, *e*) with four stout spines near the apex, on the inner edge. Anal cleft short, usually a little less than one-sixth the entire length of the body. Anal ring with *eight* hairs. No derm cells present; but there are numerous circular spinnerets (? ventral), each having an inner concentric ring. Length, 5.7–7.6 mm.

Ovisac pure white and closely felted, long and generally tortuous. Length, 10–20 mm.

GOLD COAST: Aburi, on *Aristolochia* sp., (*W. H. Patterson*).

The affinities of this insect are with *P. maxima*, Green, and *P. jacksoni*, Newst., but it differs from both in having pointed marginal spines, and from the latter species by the much denser and shorter ovisac.

***Pulvinaria elongata*, sp. nov.**

Female, adult (fig. 13, *e*). Extremely elongate or elliptical, extremities more or less equally attenuated; dorsum convex, cephalic region flattened. Colour, in life, varying from very pale crimson to bright rosy flesh-colour, with two more or less distinct, longitudinal lines of bright crimson, the latter frequently interrupted by a black wavy loop-like line, due apparently to a portion of the alimentary tract

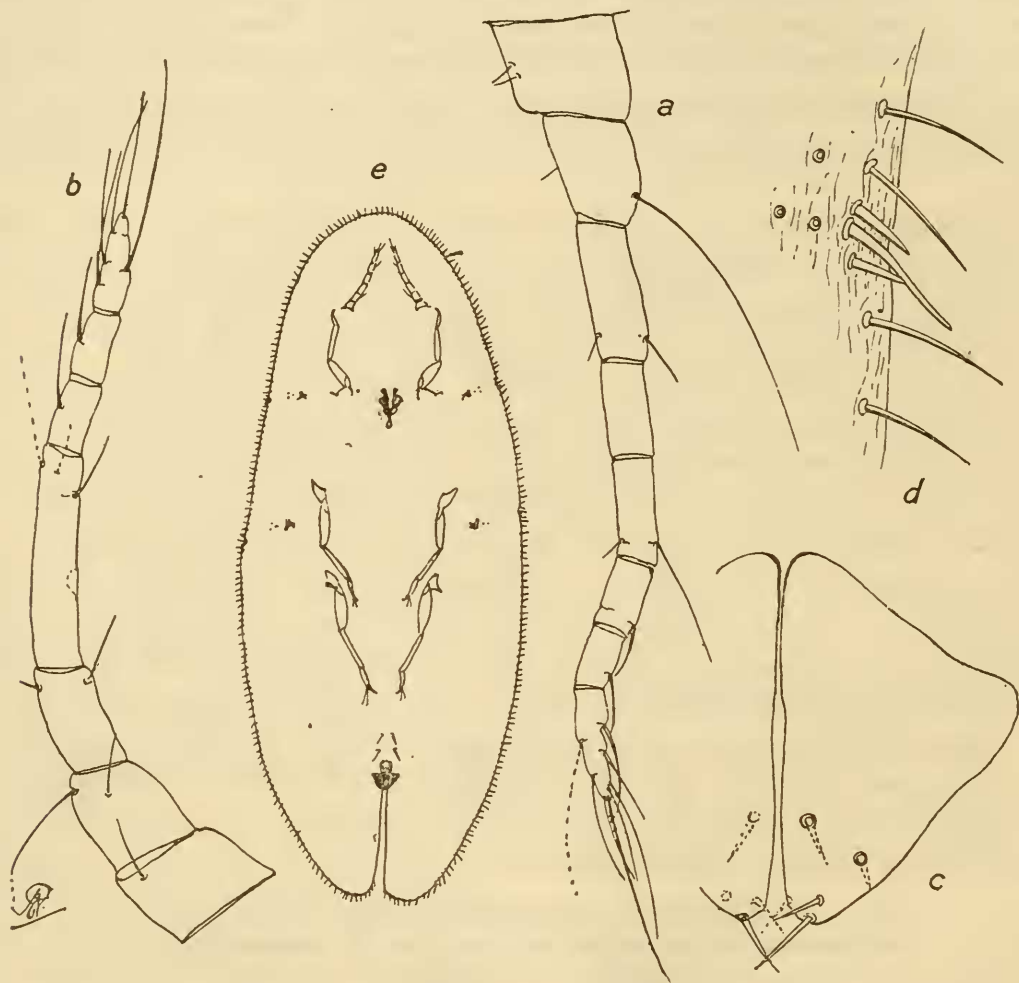


Fig. 13. *Pulvinaria elongata*, Newst., sp. n., ♀; *a*, normal 8-segmented antenna; *b*, 7-segmented antenna; *c*, anal lobes; *d*, stigmatic cleft; *e*, adult ♀.

(? Malpighian tubules). Dry cabinet specimens are pale buff, with a broad median suffused area of smoky brown or red-brown, and often with a well-defined median keel. The ovisac is very short indeed, projecting but slightly beyond the margin; it extends anteriorly, usually as far as the region of the eyes. Antennae (fig. 13, *a*) normally of eight segments, of which the 3rd is slightly the longest; in two individuals the antennae are asymmetrical, one being composed of seven segments (fig. 13, *b*) the other of eight; in the former the 4th is twice the length of the 3rd,

but it shows a partial subdivision. Legs long and somewhat slender; tarsal digitules nearly as stout as those of the claw, the latter with disc-like terminals. Anal lobes (fig. 13, *c*) with four stout spines; one apical, the others arranged in a triangle; beneath each scale are four to five very long stout hairs, which are apparently attached to the eversible sac; their number and arrangement is somewhat exceptional. Abdominal hairs very long, in two pairs. Circumgenital pores numerous, extending beyond the anal plates. Anal ring with six unusually long, stout hairs. Stigmatic cleft (fig. 13, *d*) practically obsolete; spines three, the middle one about twice the length of the laterals; margin with relatively long and very stout hairs. No derm cells present. Length, 3.5–6 mm.

Larva. Narrowly elongate. Lateral margins with widely separated, stout hairs; frons with nine to ten similar but much longer and stouter hairs or spines; these are packed closely together and give the insect a strikingly characteristic appearance. Anal lobes each with an immensely long hair. Stigmatic spines well developed, but the longest of the three is less than half the length of the marginal hairs.

BRITISH GUIANA: Georgetown, "on blade of sugar cane," 12.ii.13 (*G. E. Bodkin*).

In its general external appearance this Coccid bears a rather striking resemblance to a member of the genus *Aclerda*, owing to its elongated form and the small amount of white secretion beneath the insect, but it has no real affinity with this genus, and although the ovisac is but slightly developed, it cannot be considered as generically distinct from *Pulvinaria*; neither can it be placed, so far as one can judge, in either of the allied genera *Tectopulvinaria* or *Protopulvinaria*.

***Pulvinaria* ? *flavicans*, Mask.**

Female, adult. Dead examples shrivelled and resembling a shapeless mass of dirty, amber-coloured beeswax; dorsum in some examples with detached fragments of glassy secretory matter, with here and there particles of a white felted substance.

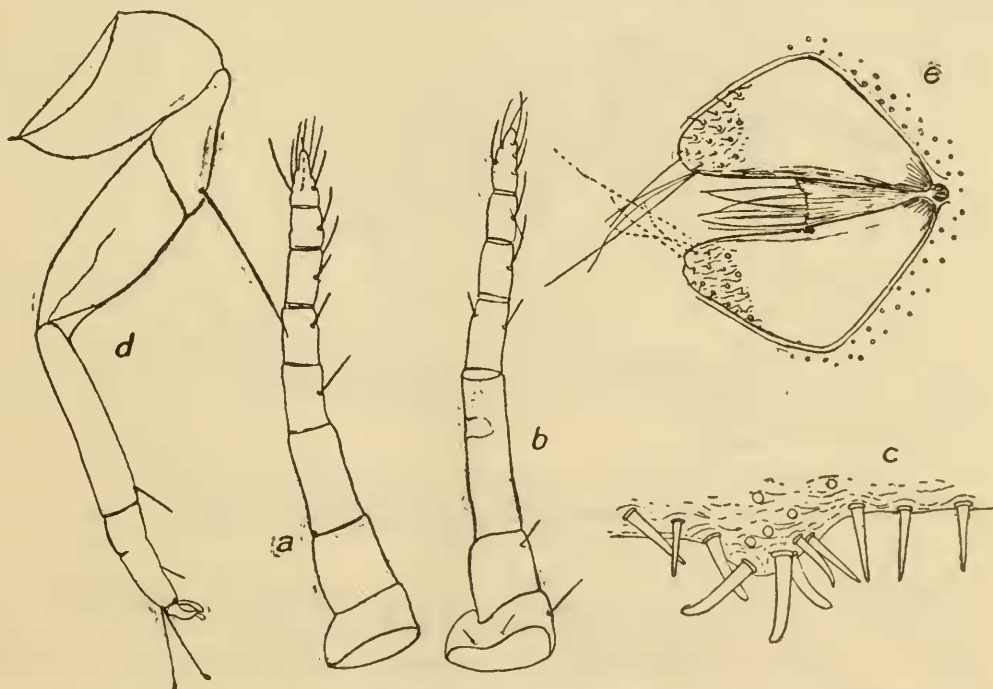


Fig. 14. *Pulvinaria* ? *flavicans*, Mask., ♀; *a*, *b*, antennae; *c*, stigmatic and marginal spines; *d*, leg; *e*, anal lobes.

Marginal spines visible under a two-inch objective. Ovisac very short, slightly overlapping the sides of the female, and most pronounced posteriorly. Specimens attacked by Chalcidid parasites are very elongate, highly convex and of a red-brown colour; no ovisac was formed by them. Length of ♀ and ovisac, 2-3.3 mm.

After treatment in KOH the form is more or less ovate or broadly pyriform. Antennae (fig. 14, *a*) normally of eight segments, rarely of seven; in the latter case the 3rd and 4th are either completely fused or only partly so (fig. 14, *b*); hairs on the terminal segments relatively short. Marginal spines (fig. 14, *c*) long, stout and pointed; they are placed closely together, the space between them being much less than their length, more especially so are they on the frons and the distal margin. Stigmatic clefts obsolete; stigmatic spines (fig. 14, *c*) usually six in number, of which two pairs are much larger than the others, broad, curved and flattened. First pair of legs (fig. 14, *d*) with the tarsus bearing a well-defined dorsal constriction. Anal lobes (fig. 14, *e*) with the distal portion thickened, convex, and with many fine hairs; beneath the tips are two pairs of long slender hairs, one pair being a little more than half the length of the lobe. Anal cleft slightly less than one-fifth the length of the insect. Anal ring with ten hairs. Circumgenital glands small, but very clearly defined. Venter, just in advance of lobes, with two pairs of hairs, one pair much longer than the other. No derm glands or pores traceable. Length, 2-2.5 mm.; width, 1.5-2.6 mm.

BRITISH GUIANA: Rockstone, on "blood-wood" plant, 30.xii.13 (*G. E. Bodkin*).

A species of ant had built little shelters or "tents" over some of the females.

***Pulvinaria subterranea*, sp. nov.**

Ovisac. White and felted and, when complete, very elongate, with traces on the proximal portion of 3-4 longitudinal grooves; incomplete forms more robust and decidedly more convex. Length of elongated forms, 3.5-4.5 mm.; short forms, 2-2.5 mm.

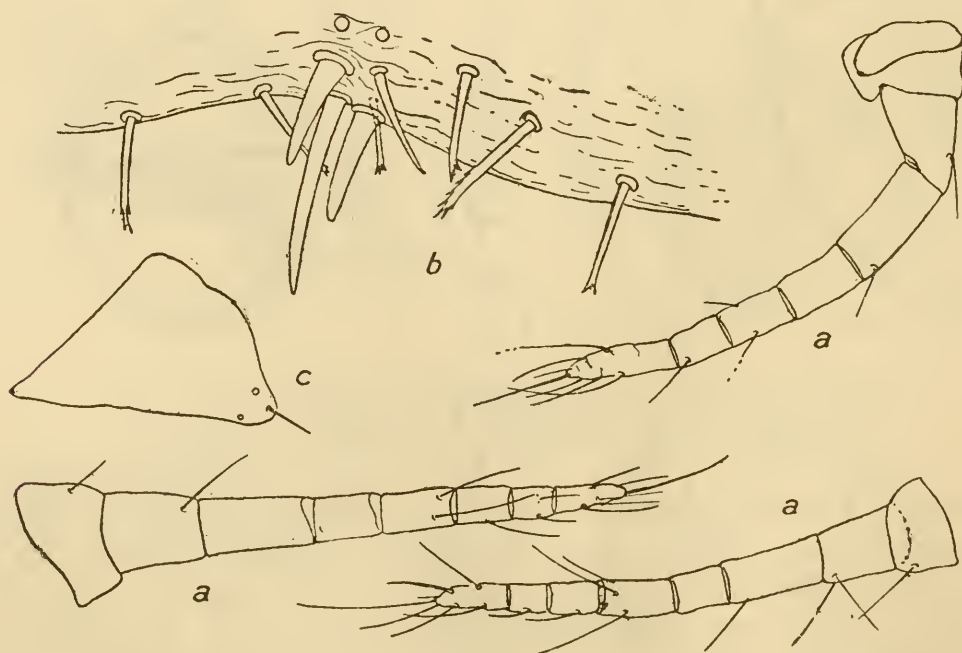


Fig. 15. *Pulvinaria subterranea*, Newst., sp. n., ♀; *a, a*, antennae; *b*, stigmatic cleft and marginal spines; *c*, anal lobe.

Female, adult. Tilted and shrivelled at gestation; after treatment in KOH broadly ovate. Colour pale brown. Antennae (fig. 15, *a, a*) usually of eight segments, rarely of seven; in the former case, the 4th is shorter than the 5th, and the 3rd the longest; in the example with seven segments the 4th, 5th and 6th are equal, the 3rd and the 6th are also of equal length and the longest. Legs very robust; lower digitules stout and strongly dilated. Stigmatic clefts (fig. 15, *b*) barely indicated; spines three, the laterals about half the length of the central one and much the stoutest. Marginal spines (fig. 15, *b*) long and for the most part faintly frayed distally; those at the anal margin slightly the longest; they are somewhat irregularly arranged and in places are two deep. Anal cleft about two and one-fourth times as long as the lobes; the latter (fig. 15, *c*) somewhat variable, with one apical and generally two subapical bristles. Derm glands scarcely traceable, even in well stained specimens, and then only in one or two places as small and approximately oval spots. Length, 1.5–2 mm.; width, 0.95–1.5.

UGANDA: Entebbe, on roots of *Chrysanthemum*, 10.iii.14 (C. C. Gowley).

***Pulvinaria africana*, sp. nov.**

Female, adult.—More or less ovate, narrowed anteriorly. Colour (in formol) dull amber-yellow; surface of many individuals with a faint black network formed by the mycelium of a fungus. Ovisac closely felted, elongate, with the sides more or less parallel, straight or curved; surface usually with four well-defined, rounded, longitudinal keels, and transverse conchoidal wrinkles. Antennae (fig. 16, *a*) normally

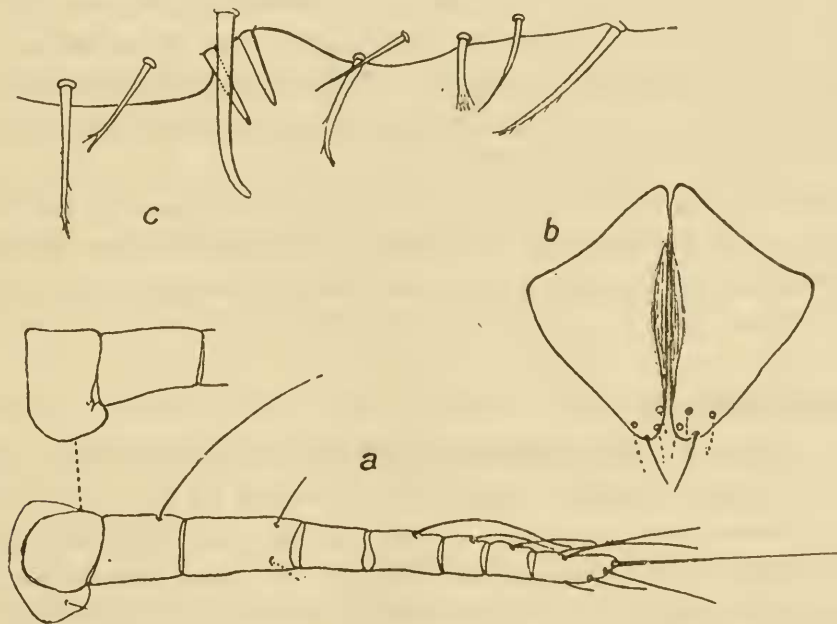


Fig. 16. *Pulvinaria africana*, Newst., sp. n., ♀;
a, antenna; *b*, anal lobes; *c*, stigmatic cleft and spines.

of eight segments, of which the 3rd is slightly the longest; formula: 3 (2, 8) 1, (4, 5) (6, 7); in one example the antennae are asymmetrical:—one being normal, the other of six segments only, of which the 4th is much the longest. Legs somewhat robust; anterior tarsi with a median constriction. Anal cleft short, about twice the length of the lobes or one-eighth the length of the body. Anal lobes (fig. 16, *b*)

with four or five apical bristles. Stigmatic clefts (fig. 16, c) clearly defined but small; spines three, all of them stout and bluntly pointed, the central one curved and a little more than twice the length of the laterals. Marginal spines (fig. 16, c) in two irregular rows; these are of two forms: one long and stout, with fine lateral hairs; the other much shorter, usually simple, but here and there one may be found with a divided tip. Arising from near the insertion of each antenna is a group of three bristles, each successively longer than the other, the longest being nearly equal in length to the 2nd and 3rd segments of the antennae together. Derm cells irregularly oval or circular, but these are quite obscure in the majority of the specimens. Length, 1.8–2.2 mm. Length of ovisac, 3.5–4 mm.; width, 1.5 mm. (average).

GOLD COAST: Accra, on guava, 2.viii.16 (*Dr. J. W. Scott Macfie*); heavy infestation.

Clearly this is not *Pulvinaria psidii*, Mask., as defined by either Maskell* or Green†. It differs in a marked degree in the form of the ovisac, and also in the character of the marginal spines, which are not dilated and dentate distally and are moreover, so far as I can judge, relatively very much larger, more irregularly arranged and not nearly so uniform in length. It is also not specifically identical with the specimens of *P. psidii*, Mask., recorded by me in this Bulletin (Vol. i, p. 67, and Vol. ii, p. 94). Many of the examples were attacked by a parasitic fungus, and they were also preyed upon by a predaceous Lepidopterous larva, of which there were several examples. A description of the cocoons of the latter is appended below.

Larva with the whole of the upper surface protected by a tough silken cocoon, into which is incorporated the remains of the Coccid (*Pulvinaria africana*, Newst.) and its ovisac; the bodies of the female Coccids often more or less intact; the remains of the ovisacs are sometimes arranged in narrow spiral-like bands, or they may completely cover the semi-cocoon. Plant hairs and the mycelium of a fungus also present. Ventral surface of the larva nude.

Cocoon, containing a parasitised pupa, complete, but thinner on the ventral surface than elsewhere. The general form is slightly more elongate than the semi-cocoon of the larva. Comminuted remains of the Coccid and its ovisac incorporated, as in the cocoon of the larva.

Ceroplastes avicenniae, sp. nov.

Female test. More or less hemispherical, smooth and more or less evenly rounded, with very faint traces of plates, apparently arranged as follows: one dorsal, one anterior, two bilateral and one anal; in each of the first three is a dark brown or almost black nuclear spot with a white centre; the anal plate with three similar spots placed closely together, the central one, formed by the tip of the caudal process, being without a white centre. Two examples gave the following measurements: (1) length, 7.5 mm., diameter, 7 mm., height, 6 mm.; (2) length, 7 mm., diameter, 6 mm., height, 6 mm.

Female, adult. Semiglobular in shape, but slightly longer than broad; integument highly chitinised but thin; submarginal tubercles well developed and five in number;

* N.Z. Trans., XXV, p. 223 (1892).

† Coccidae of Ceylon, p. 264 (1909).

one cephalic and two bilateral, each of the latter placed just above the stigmatic clefts; median dorsal tubercle prominent and keel-like. Caudal process long, stout, measuring 1.2–1.3 mm. long. Frontal margin slightly produced; posterior margin, immediately beneath the caudal process, with a similar projection but wider and with a median division (anal cleft). Stigmatic clefts quite small and shallow. Antennae of eight segments, of which the 3rd, 5th, and 8th are the longest. Stigmatic spines minute, conical, arranged three to four deep, centrally, but diminishing in number bilaterally at the extreme margin. Legs normal, as far as can be traced. Gland pores of the integument simple, somewhat thinly and irregularly scattered. Marginal spines not traceable in the three females examined.

BRITISH GUIANA: Mahaica Creek, on courida (*Avicennia nitida*), viii. 1916 (*G. E. Bodkin*).

The old adults when denuded of the test are very like those of *Ceroplastes ceriferus* (Anderson), but the caudal process is slightly shorter and the number and arrangement of the submarginal tubercles differ in a marked degree. Only one antenna has been studied, and this, so far as one can judge, consists of eight segments, but the articulations are ill-defined and difficult to trace; clearly however it is markedly different from that of *C. ceriferus*.

***Ceroplastes bipartitus*, sp. nov.**

Female test. Colour, in dried specimens, very like pale dirty beeswax. In the young adults the test is broadly oval, somewhat hemispherical and divided into nine plates: three bilateral, one cephalic, one anal and one dorsal, the last-named with a conspicuous dark brown or blackish, oval spot, with a central elongated patch of pure white wax; the nuclear spots to the lateral plates are smaller and generally much less conspicuous than the dorsal one. Margin over the stigmatic areas with a pair of laterally compressed and somewhat disc-shaped extensions, each extension carrying *on its edge* a narrow strip of opaque white wax, the tip of which sometimes reaches the dark nuclear spot of the lateral thoracic plate. In very old examples the test has increased in thickness considerably, but this has been so much damaged in transit as to render it useless for descriptive purposes; however, one can trace the curious marginal extensions, which are somewhat like a narrow-waisted and distorted bobbin, or the toy used in the once popular game "diabolo." Average length of young adults, 3 mm.; height, 1.6–2 mm.; average length of old adults, 6 mm.; height doubtful.

Female, adult. Denuded of wax, hemispherical; caudal process very long, varying in length from one-half to a little less than one-half the length of the remaining portion of the insect. Submarginal tubercles small, but generally clearly defined: one cephalic and three bilateral, the two over the stigmata slightly more pronounced than the rest. When examined under a high power lens, by transmitted light, these tubercles are seen to be traversed by clear cell-like tracts forming an irregular reticulated pattern. It is reasonable to assume, therefore, that these may be the special set of glands which secrete the nuclear spots in the centre of the plates in the test. Derm relatively thin, but strongly chitinised. Pores minute, separated over a large portion of the dorsum by slightly varying distances equalling the length of one of

the short segments of the antennae or two of them together. Stigmatic clefts (fig. 17, *b*) relatively shallow, but very clearly defined; spines short, obconical, those at the extreme margin very minute and stud-like. Marginal spines or hairs not traceable. Antennae (fig. 17, *a*) of six segments, the 3rd longer than the last three together. Legs normal. Length of denuded female, inclusive of the caudal process, 4.5–4.6 mm.; length of caudal process, 1.3–1.5 mm.

Male puparium (fig. 17, *e, e*₁). Consisting of two distinct parts; the lower half boat-shaped, and of a glassy, vesicular texture, as in those typical of the genus *Lecanium*; the upper portion *opaque*, low, convex, and of a dirty beeswax colour, with nine narrowly rectangular, submarginal patches of snow-white secretion. Anal

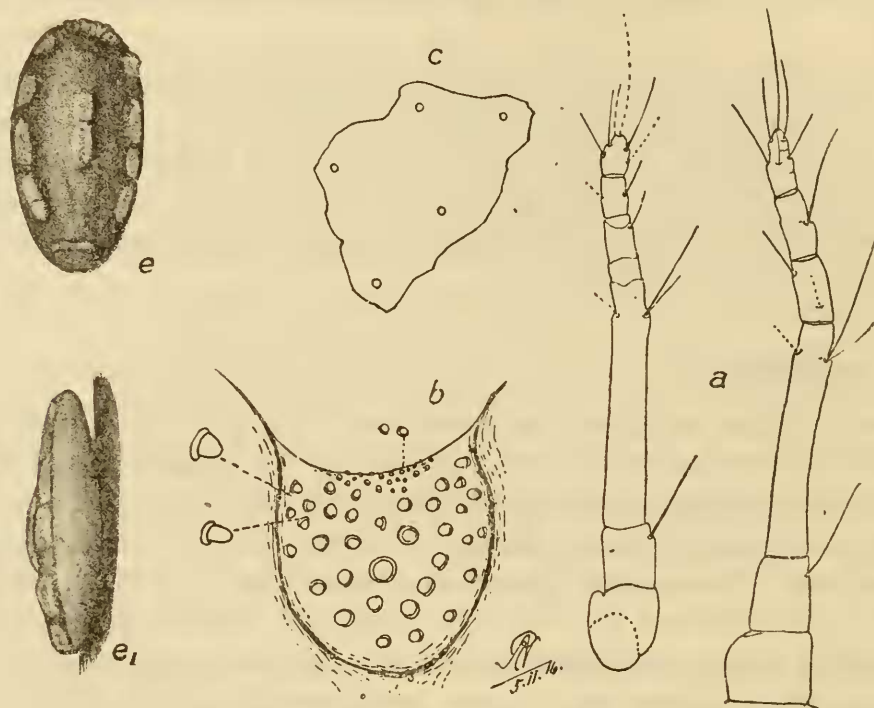


Fig. 17. *Ceroplastes bipartitus*, Newst., sp. n. :
a, antennae of ♀; *b*, stigmatic cleft of ♀; *c*, derm of ♀;
*e, e*₁, puparium of ♂, dorsal and lateral views.

cleft apparently obsolete. On the emergence of the male the whole of the upper portion falls away, leaving the ventral half attached to the food-plant. The line of cleavage between the upper and lower portion is clearly defined in those puparia from which the imprisoned male has not escaped. Length, 1.6 mm.

SOUTH AFRICA, 1914 (*de Charmoy*).

***Ceroplastes destructor*, sp. nov.**

Ceroplastes ceriferus (Anderson) Newstead, Bull. Ent. Res. i, pp. 66, 195 (1910).

Female test. White, creamy white or dirty white; exceedingly soft and containing an excess of moisture. Form irregular, with large but ill-defined gibbose protruberances; sides usually with two narrow opaque lines of secretion from the stigmatic clefts. No trace of lateral plates. Length, 5–8 mm.

Female, adult. More or less hemispherical, with the sides often slightly compressed; caudal process long; integument castaneous and highly chitinised, smooth and

shining, and without fovea or lateral tubercles. Antennae of six segments, the 3rd being as long as the 4th, 5th, and 6th together; the last three segments with stiff and bluntly pointed, spinose hairs. Legs small; hind femora very short and often distinctly incrassate; hind tarsi equal in length to the tibiae, or sometimes slightly longer. Claw very short; lower digitules very long and stout; upper digitules normal. Stigmatic clefts well defined, but relatively small; stigmatic spines very small and pointed, bases not constricted; basal attachment (disk) very large. Caudal process (after maceration) transparent and somewhat flexible; sides with an irregular double row of short spinose hairs, and in addition to these there are two pairs of longer hairs (one pair of which is twice the length of the others) slightly ventral to the row of short ones and towards the distal extremity. Anal lobes short and highly chitinised. Dorsal pores very small, rather widely separated. Ventral integument opposite the caudal process, with rather extensive groups of circular pores, many of which, in well cleared specimens, are linked together with lines of dark chitin. Length, 4–7 mm.

Female, second stage. Pyriform, the sides without tubercular projections; caudal process long. Eyes relatively large. Antennae of six segments and very similar

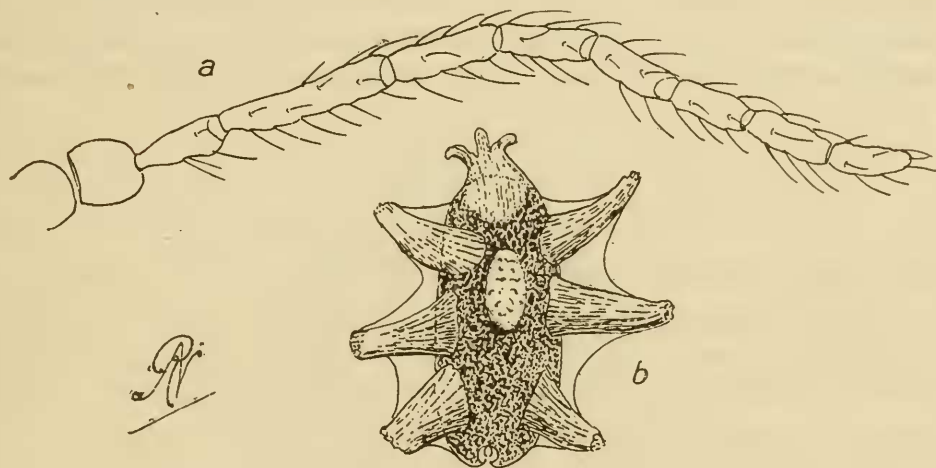


Fig. 18. *Ceroplastes destructor*, Newst., ♂; *a*, antenna; *b*, puparium.

to those of the old adult female. Legs small; tibiae and tarsi of equal length. Stigmata large; parastigmatic glands extending in a broad band to the stigmatic clefts. Stigmatic spines 40–50 in number, one of which is considerably larger than the rest; there is also a single long simple spine on either side of the group, near the extreme margin. Ventral group of circular pores slightly larger than those in the adult, and the chitinous strips connecting them are absent. Dorsum thickly studded with spinnerets, which are interspersed with short stout spines dilated distally. Caudal process absent. Length, 2–3.7 mm.

In the second larval stage of the female the waxen appendages are arranged in a very similar way to those in *Ceroplastes ceriferus*, Anderson.

Male puparium (fig. 18, *b*). Elongate, faintly yellowish white or faintly greenish yellow; texture hard, glass-like and opalescent; dorsum with a central boss-like patch of white secretion; margins with three relatively large, opaque, white appendages, which are often sub-divided. Anterior extremity with three similar but much

smaller appendages, the outer ones diverging from the central one; these processes are however often wanting and seem to be readily abraded; many of them are also strongly recurved over the dorsum. Length, 1.5–1.7 mm.

Male. Dried examples dull red-brown or dusky brownish-crimson. Ventral ocelli in a single pair. Antennae (fig. 18, *a*) short and stout and of ten segments. Genital armature styliform and very long. No visible trace of caudal filaments, though the usual organs for the attachment of these are present. Wings strongly and beautifully iridescent, and when seen by direct light the membrane appears distinctly and regularly punctate.

This *Ceroplastes* has twice previously been recorded (*loc. cit.*) as being doubtfully referable to *C. ceriferus*, Anderson; and this chiefly because of the striking similarity of the old adult females to those of the latter. With a more extensive series of specimens, in all stages, one has been able to gather that the Uganda insect is in many ways markedly distinct; more especially so are the young adult females, the male and its puparium.

***Ceroplastes egbarum*, Ckll.**

Male puparium. Narrowly elongate; ventral half shaped like a shallow boat, opaque glassy white; upper half also glassy *beneath*, but covered with a thick, opaque, creamy-white layer of wax; with or without a median depression, in the

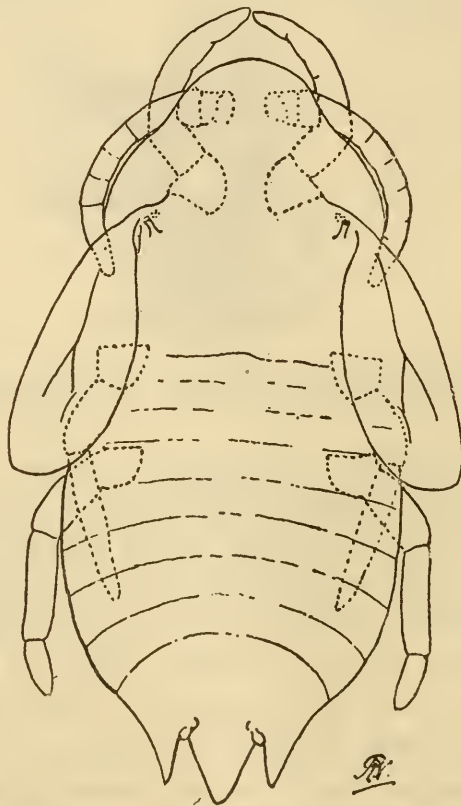


Fig. 19. *Ceroplastes egbarum*, Ckll., ♂ pupa, $\times 130$.

centre of which is a very short elongated process of white faintly segmented secretion, which is broadly divided transversely in the centre. Marginal processes similar; three on each side and two cephalic. The dorso-ventral scales are rather widely

separated distally from a point near the centre of the puparium, so that the terminal portion of the abdomen of the enclosed pupa is more or less exposed. The examples submitted are grouped together in long narrow colonies, two or three abreast, one overlapping the other with, generally, the lower half of the puparium only exposed. Length, 2-2.2 mm. ; width, 1 mm.

Pupa (fig. 19, a). With well developed wing-pads and three large anal tubercles. Length, 2 mm.

Pro-pupa. Antennae of six segments, of which the 3rd and 6th are longest, the former longest of all. Stigmatic spines three, narrowly conical, the central one the longest. Marginal hairs few and widely separated. Just within the margin is a series of exceptionally long subcutaneous gland-tubes, which are placed rather closely together.

GOLD COAST: Tamale, on *Pithecolobium saman*, 31.i.16 (*C. Saunders*).

The discovery of the male puparia is of much interest. They were attached to the same branch as two of the females, but were slightly separated from the latter.

***Ceroplastes lamborni*, sp. nov.**

Test of old adult female. Conical, more or less vertical in front and sloping upwards and forwards from the caudal process; sides with faint traces of three stigmatic plates. The four white stigmatic processes extending beyond the margin. Colour, in old dried examples, dusky red-brown and somewhat oily in appearance. Texture hard and almost as brittle as resin. Length, 3.5 mm. ; height, 3.5 mm. A slightly larger example was also submitted, but this was imperfect.

Female, old adult. Dorsum obconical, with a deep constriction at the base in a line with the caudal process; sides below the constriction bulging and irregular; cephalic lobe well defined. Stigmatic clefts deep, but relatively small. Caudal process very short, piceous. Integument shining, dull castaneous; the conical projection of the dorsum with obscure black and more or less confluent spots. Antennae of six segments, the 3rd much the longest and occasionally with a partial sub-division, the length equalling the three succeeding segments; formula: 3, 2, 6, 1 (4, 5). Legs normal. Stigmatic spines small, conical and arranged in a relatively large, compact group; one of them, near the centre, is slightly larger than the rest. Dorsal pores small, with a minute cylindrical *external* projection resembling a truncated spine; intervening spaces faintly reticulated. Marginal spines traceable only in places, minute and hair-like.

Female test, second stage. Somewhat rectangular in outline; dorsum with a well-marked and somewhat angular prominence, behind which, immediately over the anal orifice, is a broad tongue-shaped plate of dull white secretion; sides with three well-defined plates; stigmatic processes pure white and projecting considerably beyond the margin, when perfect. Spaces between the plates and elsewhere translucent, the colour of the sublying insect showing faintly through. Texture hard and brittle.

Female, second stage. Elongate, narrowed and produced in front, truncate posteriorly; dorsum with a strong keel or, in more advanced specimens, a fusiform swelling, surrounded by a deep channel; sides more or less vertical; venter flat; eyes prominent; cephalic lobe strongly produced. Stigmatic clefts well defined.

On maceration in KOH the integument is thin and transparent, with the exception of a small portion surrounding the minute caudal process. In very young females the test is ovate, opaque and glassy, with a very elongated plate of buff-yellow secretion, the posterior end of which rests against the naked caudal process. Stigmatic processes pure white and projecting beyond the margin.

SOUTHERN NIGERIA: Ibadan, on cacao and "on a large climber on bush tree" (Dr. W. A. Lamborn).

The tests of the old adults bear some resemblance to those of *Ceroplastes coniformis*, Newst., but are markedly distinct. There is a striking, indeed a remarkable, difference between the young and old examples, but their structural details are specifically identical.

***Ceroplastes subdenudatus*, sp. nov.**

Female test. Incomplete, covering only the central portion of the dorsum of the ♀; this is more or less bluntly conical, the apex with an irregularly pointed patch of dull white wax, sometimes faintly stained with yellow or yellowish brown, with a central nuclear spot; the rest of the body of the ♀ with a thin transparent coating of varnish-like secretion; stigmatic processes white, thread-like and curly, resting upon the sides of the ♀. Greatest diameter, 2.5–3.4; height, 2.3–3.6 mm.

Female, adult. Somewhat hemispherical, but the height is slightly greater than the diameter at the base, the latter circular in outline. Cephalic lobe and stigmatic clefts rudimentary. Caudal process rudimentary and placed, as a rule, just above the middle line between the margin and the centre of the dorsum. Surface shining, faintly wrinkled at the sides. Antennae relatively small, of seven segments; 4th much the longest; formula, 4, 2, 3, 7, 1 (5, 6), or the 7th may equal the 3rd; long stout spines on the last three segments. Stigmatic spines of two types; those at the margin stout and pointed, forming a group of 15–16; the inner group obconical and numbering 19–22. Marginal spines similar to the pointed ones in the stigmatic clefts; very few at the sides, but they are placed closely together on the cephalic margin. Postanal arch of chitin with a well-marked series of circular pores.

Two specimens gave the following measurements: (1) diameter, 2.4; height, 3.3; (2) diameter, 3.2; height, 3.5 mm.

UGANDA: Entebbe, on *Acacia* sp., 7.iv.14 (C. C. Gowdey).

Easily distinguished by the apical patch of white wax and the unusually long 4th segment of the antennae.

Ceroplastes vuilleti*, Marchal.

Puparium of male. Elongate. Colour of the dorsal half somewhat like that of dirty beeswax, with seven relatively large protuberances partly covered with dirty white, granular wax; one anterior, three bilateral and one central. Lower half shaped like a shallow boat; posterior extremity often tilted upwards, with a narrow transverse slit between the dorsal and ventral portions. Inner surface dirty grey. Length, 1.4–1.5 mm.; width, 0.7–0.8 mm.

* Bull. Soc. Zool. France, 1909, p. 68; Mem. Soc. Zool. France, xxii, p. 165 (1909).

The specimens are badly weathered and discoloured, so that too much importance must not be attached to the colour of the puparia as given above. It is highly probable that the protuberances of the dorsum were pure white when quite fresh and that the texture was also more or less glassy.

Female, adult. Marchal (*l. c.*) has described the female and its test, in detail; but there are some structural points which need elaboration and these are appended below.

Antennae (fig. 20 *a, a*) of eight segments, the articulations of the last four segments appearing very broad owing to the thinning down of the surrounding chitin; in one example the 4th and 7th segments show partial but irregular and incomplete articulation. Another example has the normal number of segments on one side, and on the other only six; the latter is clearly malformed, owing possibly to the presence of Chalcidid parasites. Legs normal; lower pair of digitules not so markedly dilated as is usual in the members of this genus; tarsi shorter than the tibiae. Dorsal pores (fig. 20, *b*) very numerous; the intervening spaces finely and faintly reticulated in the more highly chitinised portions. Stigmatic clefts deep and

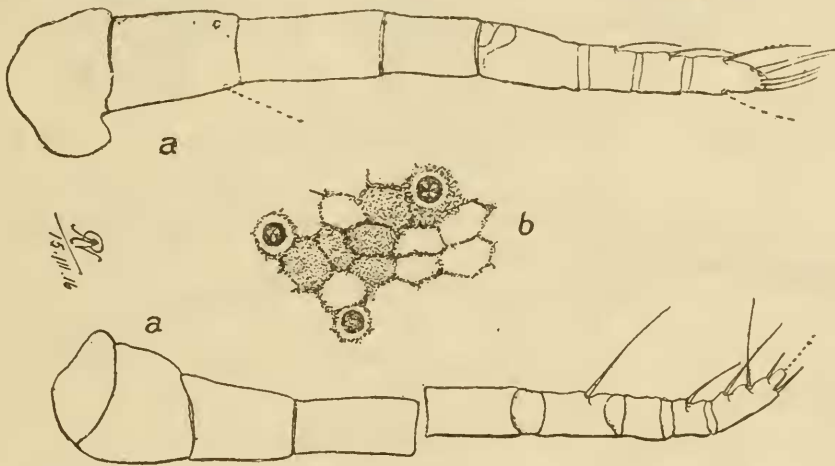


Fig 20. *Ceroplastes vuilleti*, Marchal, ♀; *a, a*, antennae; *b*, derm glands.

broad; the spines at the outer edge relatively long and pointed; the broadly ovate, inner group very short, conical and placed *closely together*; one in the centre of the group is larger than the rest. Marginal spines similar to those at the edge of the stigmatic clefts, but smaller and widely separated. A number of minute spines are scattered over the dorsum.

Marchal found one antenna with nine segments, but states that the additional segment was probably due to the sub-division of the 8th. His description and figure of the stigmatic cleft and the marginal spines is correct, but he evidently failed to determine the true character of the group of minute conical spines on the interior of the clefts. Apart from these details my examples agree with the rest of Dr. Marchal's description and figures.

S. NIGERIA: Agege and Ibadan, abundantly on pigeon-peas, 1913 (*Dr. W. A. Lamborn*).

Dr. Lamborn is to be congratulated on the discovery of the male puparia, as little is known, comparatively speaking, of the males or their metamorphoses in this genus.

Ceroplastes zonatus, sp. nov.

Female test. Broadly ovate in outline, highly convex; marginal plates very faintly indicated, but apparently without nuclear spots; dorsal plate very large, with a central nuclear spot of white wax; cephalic margin slightly clypeate; lateral margins in very old examples with a pronounced foot-like extension from each of the stigmata, from which there extends a thick white waxen appendage. In the younger forms the foot-like extension is wanting, but the white waxen appendages are present and always porrected. Colour creamy white, suffused with very pale brown; dorsal plate surrounded by a shaded wavy zone of dark brown and brownish black, with here and there a suffused patch of dull flesh-colour. In very old examples the zone of colour extends to the margins and is of a shining madder-brown to piceous colour. On the removal of the outer surface of the test with chloroform, it is seen to be divided

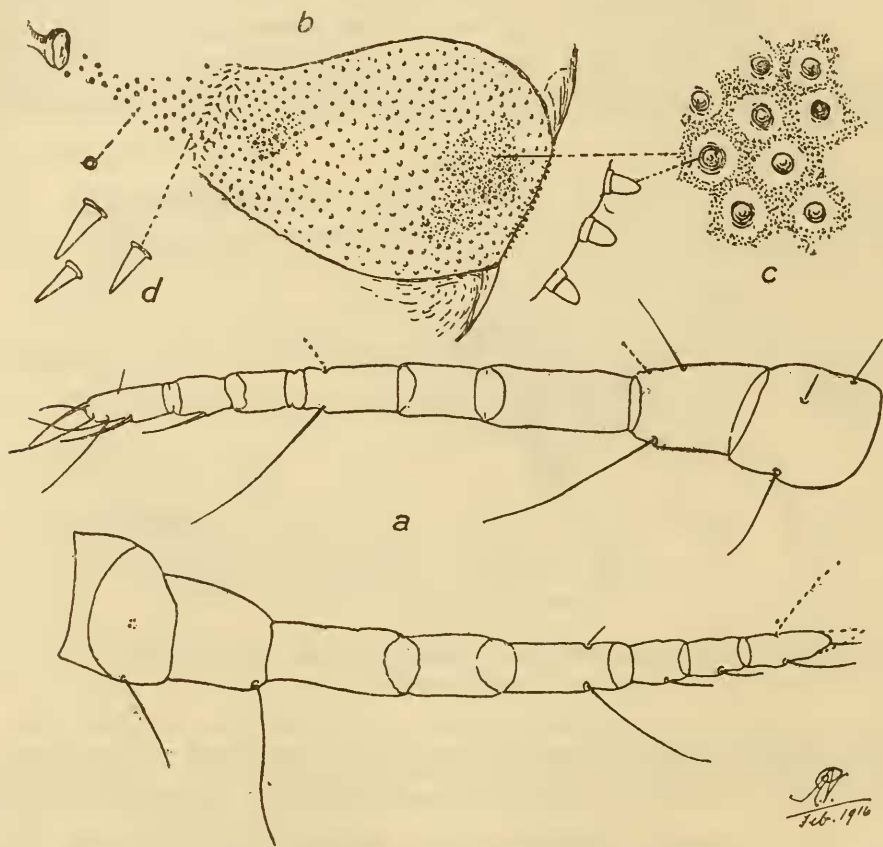


Fig. 21. *Ceroplastes zonatus*, Newst., sp. n., ♀; a, antenna; b, stigmatic cleft, with spines; c, portion of anterior group of spines; d, portion of proximal group of spines.

into seven areas by pale orange-coloured lines; a central polygonal area, corresponding to the area occupied by the dorsal plate, from the angles of which radiate to the margin single lines marking off the areas of the lateral and cephalic plates.

Female, adult (denuded of the test). Ovate; cephalic margin clypeate; dorsum low and wrinkled; two large, bilateral, submarginal extensions, both longitudinally striated; the space between these extensions of the body-wall and the margin markedly constricted. Dorsum with a large keel-like process. Caudal process very short and conical. Stigmatic clefts deep. Antennae (fig. 21, a) of eight segments; the articulations relatively very broad; 3rd about equal in length to the 7th and 8th

together; a very long hair on the 2nd and 5th, and a slightly shorter one on the 8th; there are two spines on the 8th and one on the 7th. Legs normal. Stigmatic spines (fig. 21, *b*) covering a large and somewhat pyriform area, the length of which is nearly equal to twice the length of the antennae; the spines, with the exception of a small group near the stigmata, are obconical and the space between them with bands of dark granular bodies, which collectively form a polygonal reticulation (fig. 21, *c*); the small proximal group of spines (fig. 21, *d*) are longer than the others and pointed. No trace of marginal spines. Derm thin and transparent after maceration; rather thickly set with minute pores and minute scattered spines. Caudal process surrounded by a porose zone of brown chitin. Length, 3.9–4.6 mm.

SOUTH AFRICA: 1914 (*E. d'Emmerez*).

***Inglisia theobromae*, sp. nov.**

Female test (fig. 22, *a*). Strongly bilobed, the lobes forming two cones, which are confluent at their bases; each cone is rounded ventrally and almost flat dorsally, with the ends truncated. In the younger forms the cones are fixed at an angle of, approximately, 45°; in the old adults they are much more diverted and in some

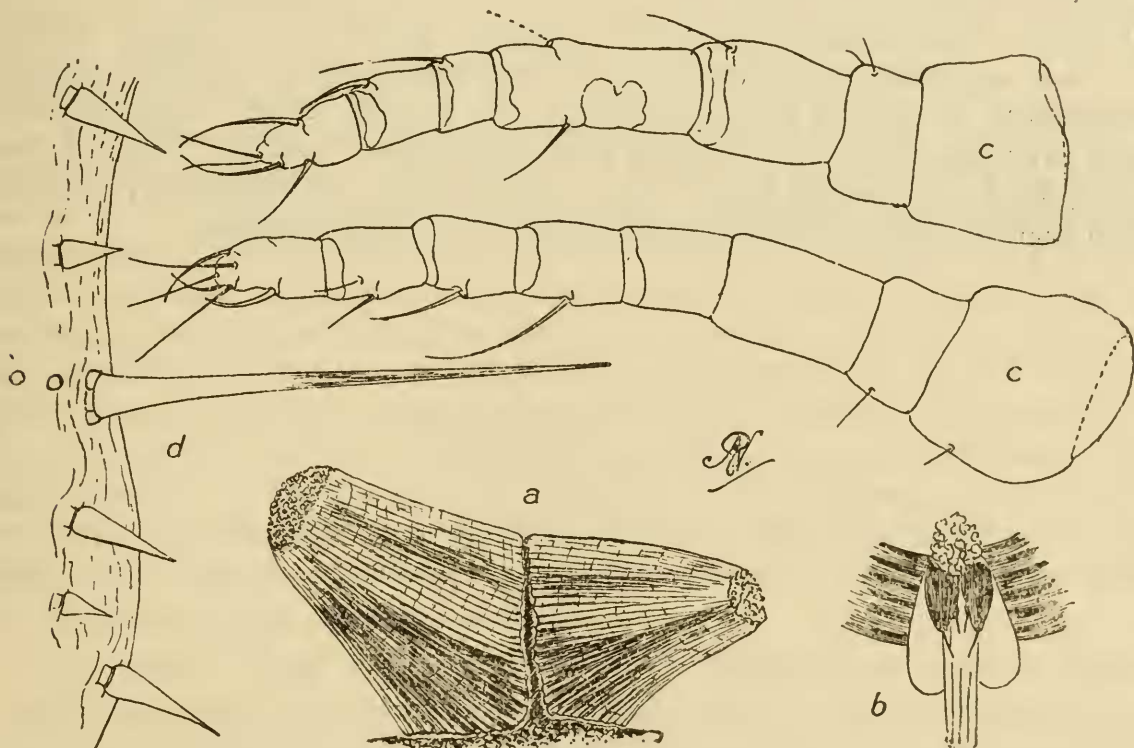


Fig. 22. *Inglisia theobromae*, Newst., sp. n., ♀; *a*, test; *b*, anal appendages of test; *c, c*, antennae; *d*, stigmatic and marginal spines.

instances assume an almost horizontal position. The cones are strongly fluted vertically and very finely striate transversely. Colour pinkish buff with a faint pearly lustre. Anal aperture (fig. 22, *b*) in the young adults with a pair of thin, translucent, waxen plates, upon which there rests a pencil of thick, white, waxy filaments with truncated ends; the latter are held in place by the anal lobes and their accompanying bristles. Above the lobes a small irregular mass of dusky secretion.

Length, between the extremities of the cones, 4·5 mm. ; height of middle line, 2 mm. Young adults measure : 2·2 mm. between the extremities of the cones, and 1·5 mm. along the middle line of the dorsum. These may be taken as average measurements.

Female, adult. Shape similar to that of the test, but shrivels on drying, so that the test readily falls away in two parts. Antennae (fig. 22 *c, c*) of seven or eight segments ; in the former case the 4th is the longest, but invariably bears one or more partial divisions ; in those having eight segments the 3rd is the longest. Stigmatic clefts obsolete, the position occupied by a single long spine (fig. 22, *d*) which is equal in length to two-thirds of the antenna ; it is sometimes strongly curved at the end. Stigmata just within the margin and between them three to four circular pores. Marginal spines (fig. 22, *d*) in an irregular row, and of two sizes ; all are conical and sharply pointed. Anal orifice surrounded by a very long loop-shaped band of dense chitin. Anal lobes pointed ; inner edge with two tubercular projections ; the tubercles and the tip each with a spine, and there is also a very large spine attachment in the middle of the apical projection. Anal ring with six hairs. A narrow line of dorsal pores extends from the anal lobes to the region of the proboscis ; the latter relatively small and the mentum monomerous.

UGANDA : Nagunga, on stems of cacao pods and flowers, 18.ix.15 (*C. C. Gowdey*).

In the form of the test this species bears a close resemblance to *I. castilloae*, Green,* but differs in having the ends truncated, in the absence of the " deep transverse furrow extending downwards from the apex of each cone " and the " rounded lips " forming the border behind and in front. Furthermore, the female of *I. castilloae* has no stigmatic spines, and the antennal characters are also different.

* Jour. Econ. Biol., vi., p. 29, pl. i. (1911).